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ORIGINAL COMMUNICATIONS.

FRACTURE OF THE LONG BONES.

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No class of surgical cases furnish material for so many damage and malpractice suits as fractures, and particularly is this true of those of the long bones. The explanation of this fact lies in the existing difficulties which prevent the surgeon from obtaining the two cardinal requirements in the successful management of all fractures, viz., the anatomical reduction and retention of the fragments during the process of repair.

Most transverse fractures, when anatomically reduced, are easily maintained in position during the process of repair, but the more we see how difficult it is to obtain anatomical reduction when operating those cases which require open treatment, the more we must admit our deception in believing we have secured perfect reduction by the ordinary methods, notwithstanding our conclusions may be corroborated by a skiagraph. In oblique and multiple fractures, instead of muscular tension favoring retention, the opposite is true, and the second cardinal requirement must be accomplished by other means. The use of extension, counter-extension, posture, and fixation splints fortunately accomplishes this object in many cases, sufficiently to give functional if not anatomical results. But in certain transverse and many oblique fractures of the long bones the difficulties encountered and the consequent poor results justify more radical procedure in the management of these selected cases.

Methods devised for the radical or so-called open treatment of fractures are based on mechanical fixation of the fragments. Such devices may be divided into those primarily intended to be removed after union has been accomplished, and those to be left in the tissues indefinitely. The Parkhill clamp with its modifications stands as the representative of the former, while the Lane plate unquestionably leads in popularity of the latter class. That good results can be accomplished by both must be admitted, but here, as in all surgical procedures, the test of experience must in the end bring us to the adoption of that method which gives the best results in the largest number of cases. The one objection to an operation of this nature, it matters not what device is used, is *infection,* and the fact that a vicious union is preferable to an infected fracture should make us hesitate to use the open treatment for a simple fracture until a careful study of the case and the adoption of every precaution safeguarding asepsis warrant operation. Further, if one method increases the danger of infection, certainly it should be discarded in favor of that proven to be less dangerous, and if it can be shown that a method has this objection, and in addition does not accomplish the prime object—fixation of the fragments—as well as another which carries with its use less danger of infection, there is no argument to support its further use. This I believe to be true in comparing all external appliances with screws passing through the soft tissues and embedded in the bone, with the Lane plate. In support of this position it is hardly nec-

essary to prove the mechanical superiority of the latter, to say nothing of the simplicity of dressings and lessened pain and discomfort afforded by the Lane plate. The danger of infection at the time of operating, of course, is equal, but to have four screws leading from the bone up to and through the skin, from four to six weeks, makes it very difficult to prevent infection, be the technique of preparation and dressing ever so thorough; whereas if the technique at the time of operation be perfect when a Lane operation is performed, the danger of descending infection is over as soon as the soft tissues have healed. Believing these facts to be true, I am naturally a strong advocate of the Lane plate in properly selected cases, and yet it is not my desire to be understood that their use is free from harmful results. However, my further experience in their use has made me more positive in the following conclusions mentioned in my paper on this subject presented to this society two years ago, viz.:

1. The open treatment of fractures insures practically anatomic reduction.

2. We have overestimated the danger of making a compound out of a simple fracture.

3. The Lane plate is the simplest and most efficient fixation device yet designed.

4. It insures immediate immobilization, which in turn means rapid repair and reduction of pain to a minimum.

5. Its application is easier and requires less mutilation and smaller incision than the use of wire.

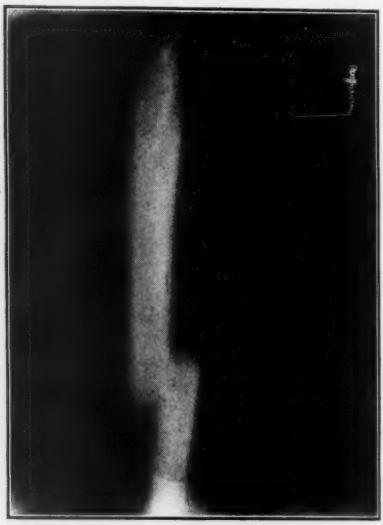
6. It is a great aid in the management of compound infected fractures.

7. Direct mechanical fixation of fractures greatly simplifies after-treatment.

8. The *x*-ray has shaken our confidence in manual reduction, and will force us to more accurate methods.

In support of these conclusions I wish to present the following cases, some of which are included in my other paper; but as the criticism then made was that sufficient time had not elapsed to judge the end result, a review of their present condition should satisfy the most doubtful opponent of the merits of this method:

Case A.—W. F., aged thirteen. Transverse fracture of the left femur, junction



Case A, Radiograph 1.

middle and upper third. Three unsuccessful attempts were made, under ether, at reduction. The deformity is shown by radiograph A, 1, and the alignment ac-

Case A, Radiograph 3.

complished by the open method is shown in radiograph A, 3. Union by first intention without shortening. In this case, however, the patient was allowed to walk too soon,

which resulted in a bowing at the seat of fracture, which was not brought to my notice until too late to correct without a second operation. This was done without infection, with a perfect result, as shown by radiograph and the patient, whom I present for examination. Over two years have elapsed since the accident.

Case B.—Man, aged forty-four. Fracture of left humerus about five inches above the elbow, involving the musculospiral groove. Several attempts were made at reduction, with and without anesthesia. Radiographs B, 1 and 2, revealed marked forward displacement of the upper end of the lower fragment. At operation the musculospiral nerve was fixed in the soft tissues by catgut sutures. Convalescence was uneventful. Union of operation wound took place by first intention. Alignment in this case, radiograph B, 3, was not so good as it should have been, but was improved by splints and compresses. Patient has been able to use his arm in the performance of manual labor, with no apparent trouble or irritation from the plate or screws.

Case B, Radiograph 1.

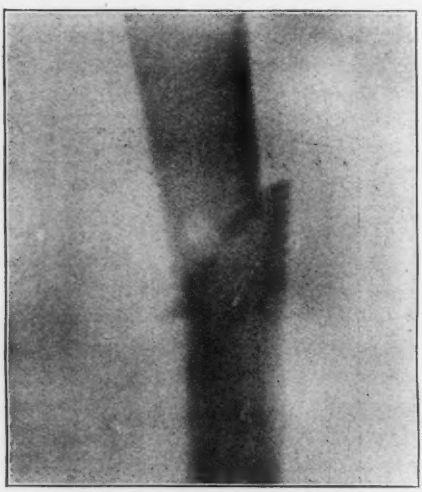
Case B, Radiograph 2.

Case B, Radiograph 3.

Case D.—Woman, aged forty-nine. Sim-

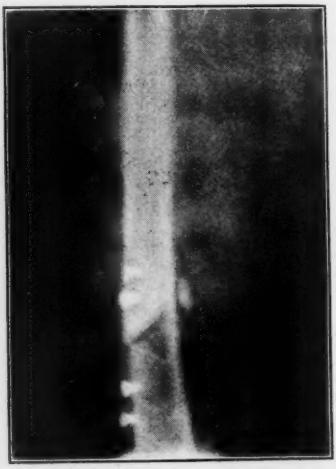
Case D, Radiograph 1.

ple fracture of left femur at lower third, with the usual backward displacement of upper end of lower fragment (radiograph D, 1). Reduction was attempted and thought to be satisfactory. Radiograph proved this conclusion to be erroneous, or



Case D, Radiograph 2.

there was subsequent displacement. Considerable difficulty was experienced at the operation to accomplish reduction. After



Case D, Radiograph 3.

application of plate convalescence was uneventful. The incision healed by first intention. The patient walked on the limb nine weeks after operation, and measurements show no shortening. A later radiograph in this case revealed that the lower end of the plate pulled away from the shaft, but fortunately the alignment of the fragments, as shown in radiograph D, 3, was not disturbed and the patient has no evidence of shortening. The projecting end of the plate interferes with the action of the quadriceps extensor, but not sufficiently so to make the patient willing to have the plate removed, which should be done. The separation of this plate from the lower fragment was due to the use of too short a screw.

Case E.—Man, aged thirty-two. Comminuted simple fracture of left humerus, with marked displacement (radiograph E,

Case E, Radiograph 1.

1). There was a large hematoma extending into the axilla and on the chest anteriorly and posteriorly. Operation was performed nine days after the injury. I considered it safe to wait until the tissues had gained some resistance. Several fragments of the bone were removed at the time of operation. Their absence is well shown in the radiograph (E, 2). Convalescence was uneventful. Union by first intention. The patient undressed and dressed himself without assistance thirty-two days after the operation. Report from this patient April 6, 1912, nearly two years after the accident, says: "I have full use of my

arm and never had any pain of any kind and no discharge from the wound. I would not know that I had a plate in."

Case E, Radiograph 2.

Case F.—Lad of six. Fell from second-story window, with resulting simple fracture of right femur just above knee (radiograph F, 1). After several unsuccessful attempts at reduction, it was accomplished

Case F, Radiograph 1.

by the open method. There was so little tendency toward displacement I was tempted to dispense with the use of the plate, but to make sure applied a two-screw plate, as shown in radiograph F, 2, which also shows reduction obtained. This boy

Case F, Radiograph 2.

has no shortening and no inconvenience from the injury of the plate left *in situ*.

Case G.—Man, aged thirty-three. Simple fracture of neck of humerus, involving the shoulder-joint. Injury caused by being trampled by an infuriated bull. The upper fragment, as shown in radiograph G, 1, was displaced with rotation and was quite difficult to replace, even by the open method (radiograph G, 2). The recovery was un-

Case G, Radiograph 1.

eventful, and the patient is able to perform manual labor without inconvenience from his injury.

Case G, Radiograph 2.

Case H.—Male, aged twenty-nine. Simple comminuted fracture of right thigh, the result of a piano falling on him. Deformity shown in radiograph H, 1. Lane plate and wire to purse in loose fragments used. While carrying patient up a crooked stair-

Case H, Radiograph 1.

way seven weeks after operation the plate broke (radiograph H, 2), but this accident did not interfere with union, although it allowed a little outward bowing of the shaft. Patient eight months afterward is

Case H, Radiograph 2.

walking without a cane and has less than one inch shortening.

Case I.—An Italian woman aged thirty-three; seven and one-half months pregnant.

Case I, Radiograph 1.

Double compound fracture of right thigh, caused by a street-car accident. One wound in upper end of popliteal space, the other on anterior surface of thigh opposite seat of fracture. Displacement of fragments shown in radiograph I, 1. Alignment by

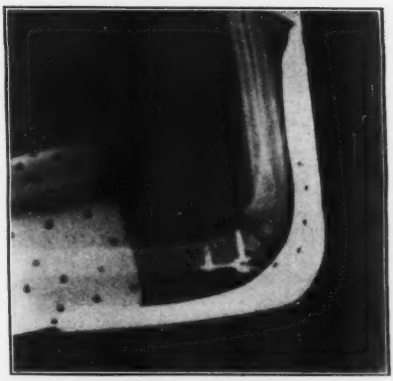
Lane plate, radiograph I, 2. Patient in spite of careful watching persisted in removing her dressings several times during her stay in the hospital, which she left before discharged. Radiograph I, 3, taken when she left, shows she bent the plate, but the screws held. Patient was delivered at full term and her wound healed without suppuration.

Case I, Radiograph 2.

Case I, Radiograph 3.

Case J.—Boy, aged eight. Transverse simple fracture of left humerus above elbow (radiograph J, 1). A Y-plate was used, one screw-hole being fixed with wire, owing to thinness of fragment (radiograph

Case J, Radiograph 1.



Case J, Radiograph 3.

Case J, Radiograph 4.

J, 3). Wound healed without infection, but plate was removed ten weeks after operation, owing to its proximity to the elbow-joint. Patient three months after operation (radiograph J, 4) had perfect pronation and supination and twenty degrees flexion.

Case K.—F. W., aged thirty-eight. Compound fracture of both bones of left leg.

Case K, Radiograph 1.

Wound of soft parts slightly enlarged and plate applied (radiograph K, 1). Plate removed at the end of seven weeks. Good union and no shortening. Wound of soft parts, opened and discharged for three months after the removal of the plate, healed for past four months.

Case N.—Boy aged three and one-half years. Simple transverse fracture of middle of left femur. Plated one week after injury, owing to inability to reduce and keep the fragments in place. Alignment shown in radiograph N, 1. Negatives of radiograph taken prior to operation were lost. Wound healed by first intention, and patient eight months after operation was running and playing without complaint. No shortening or evidence of irritation.

Case N, Radiograph 1.

Case P.—Boy, aged eighteen. Compound comminuted fracture of the left humerus, caused by the passage of a loaded coal wagon (7450 pounds) over the member.

Case P, Radiograph 1.

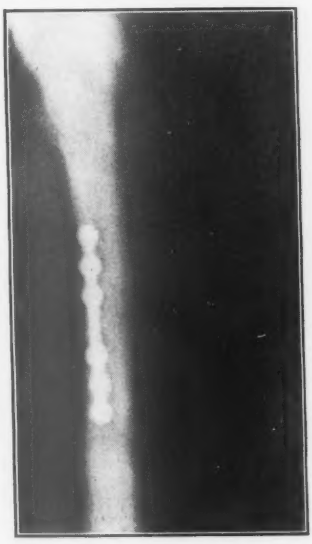
Operation was performed two days after the injury. The patient traveled 150 miles from an inaccessible part of the State. The comminuted fragments were removed. The extensor muscles of the arm were severed by the crushing force of the wheels. The musculospiral was tucked into the lower segment of the triceps. There was no infection of the wound, which healed kindly as soon as the devitalized soft parts separated. Alignment is well shown in the radiograph (P, 1). Two years after injury report says: "The arm is just as good as the other one. He leads a rather strenuous life, rides wild horses, etc. I don't think there is anything in the way he

uses his arm that would attract your attention if you did not know he had been hurt."

Case R.—Young lady, aged twenty-one.

Case R, Radiograph 1.

Simple ununited fracture, five months, of left femur, junction upper and middle third

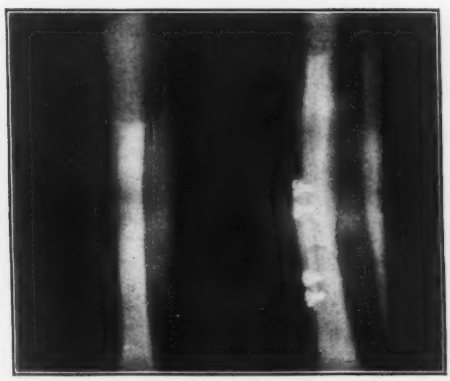


Case R, Radiograph 2.

(radiograph R, 1). Ends of fragments squared and Lane plate applied (radiograph R, 2). Wound healed promptly without infection. Less than one-half inch shortening.

The foregoing cases illustrate what can be done with the Lane plate in clean cases. Unquestionably it is most applicable in this class of fractures; nevertheless in some infected cases this method of treatment can be used to advantage, as the immediate although temporary fixation simplifies the management of the injured member, relieves the pain, and increases the chance of getting control of the infection. In accomplishing these things, however, it must be recognized that the screws and the drill holes in the presence of infection favor necrosis, and therefore the damage done by the use of the Lane plate in this class of cases must be taken into consideration before the advantage to be gained will justify its use. It must be remembered that these cases are always mean ones, and at best liable to be complicated by osteitis and necrosis. Consequently the use of the Lane plate should not bear all of the burden of such complications. Further, the condition of the bone greatly governs the degree and the duration of the fixation accomplished, which in turn measures the efficiency of the plate. The following cases, mostly failures, will give some idea of the points in question:

Case C.—Man, aged thirty-four. Com-



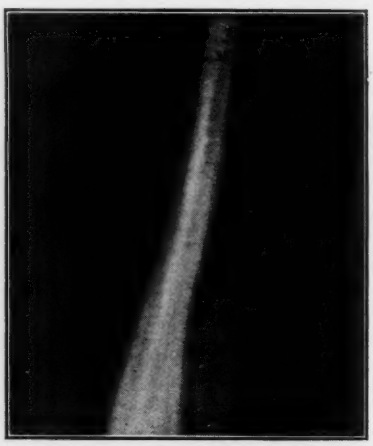
Case C, Radiograph 1.

pound infected fracture of left radius, with inward displacement of lower fragment and fracture of ulna without displacement (radiograph C, 2). Arm, forearm, and hand were badly swollen from infection of lacerated wound over the seat of fracture,

which prevented any splinting. The forearm was bound in pillows for ten days and the wound infection treated with antiseptic dressings. Three or four days prior to op-

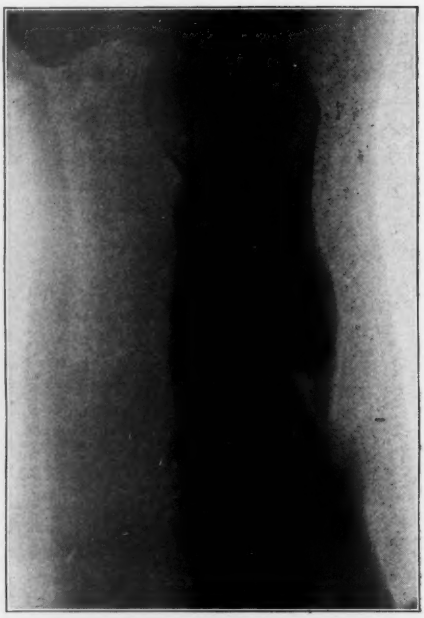
Case C, Radiograph 2.

eration a ten-per-cent balsam of Peru ointment was used. At the time of operation the granulating area was scrubbed with gauze and Harrington's solution until the granulations were removed. The wound was closed entirely except the space occupied by a small cigarette drain, which was



Case C, Radiograph 3.

removed two days afterward. Union by first intention was obtained. The result as to reduction is shown in the radiograph (C, 1). Some time after leaving the hospital signs of infection became manifest, and the plates were removed under local anesthesia. From time to time the sinus



Case M, Radiograph 1.

Case M, Radiograph 2.

leading down to the seat of fracture would discharge. Three months ago Dr. Ed. F. Dean dissected out the sinus and scraped the bone, with apparently perfect result. The condition of the arm is shown by radiograph C, 3, taken at the time of the last operation.

Case M.—Male, aged thirty-five. Bad compound comminuted fracture of tibia (radiographs M, 1, 2 and 3). Treated for eight months with fracture box. Numerous

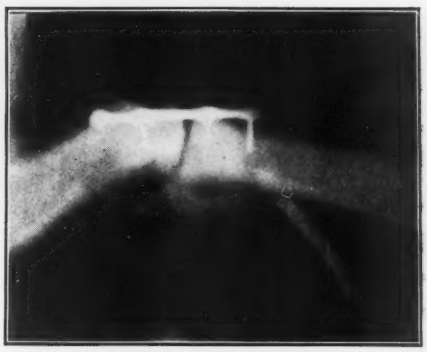
Case M, Radiograph 3.

loose fragments. Ends of fragments of shaft and gap closed by shortening fibula and pinning same to lower end of tibia with wire nail. A Lane plate was applied to tibia, but owing to the softness of the bone the screws did not hold, allowing the plate to loosen and a partial backward displacement of the upper fragment. The plate and screws were soon removed, and the wire nail later. There was some union of the fibula with distal portion of tibia. The persistence of the infection and non-union of the tibia made the patient insist on amputation, that his long illness and suffering might be brought to an end.

Case L.—Male, aged thirty-two. Infect-

Case L, Radiograph 1.

ed fracture of right femur, of long standing. Had had two operations—first a Parkhill clamp, and the second an attempt to

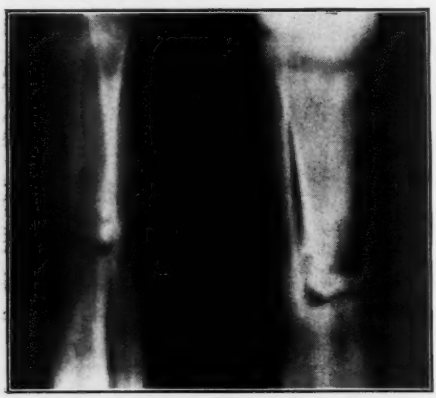


Case L, Radiograph 2.

fix the fragments by silver wire. At the time he came under my care the limb had two sinuses leading down to the seat of fracture. Condition and position of the fragments is shown in radiograph L, 1, which also shows part of two Parkhill

screws broken off in the upper fragments and the wire loop lying loose between the fragments. After their removal a Lane plate was applied, the failure of which to do good is shown in radiograph L, 2. It is my opinion, however, that in this case, had longer screws been used and a better cast applied, union might have been obtained.

Case S.—J. F., male, aged thirty. Compound comminuted infected fracture of both bones of the right leg. Lower end of upper fragment of tibia overriding the lower anteriorly, and at least three inches



Case S, Radiograph 1.

of that bone exposed and denuded of periosteum. Soft tissues from ankle to knee infiltrated with pus and much sloughing in vicinity of fracture. General condition septic, with afternoon temperature of 103° to 104°. Patient suffered great pain, which made the dressings very difficult. After ten days of unsuccessful effort to get control of infection, a Lane plate was applied to keep fragments in line and to relieve pain. This was accomplished, and in the application of the plate it was necessary to enlarge the existing wound but one-half inch at the lower end. The relief from pain was remarkable, and the operation I am sure was a great aid in getting control of the infection. The plate was left in place nine weeks, when it was still visible, the soft parts as yet not having closed in sufficiently to cover the exposed area of the tibia. At this time it was removed without the aid of an anesthetic. Two of the four screws had loosened. Since its removal several fragments of necrosed bone have been taken out, and radiograph S, 1, shows another to be removed. It also shows a spot of necrosis at the site of the upper screw-hole, and some suspicion of a similar condition at another. Another fragment which looks as if it may live is to be seen posteriorly. There is excellent union of the fibula, and better of the tibia than the radiograph would indicate, inasmuch as the patient can and does bear considerable weight on the limb in walking.

The question to be asked in reviewing this case is: How much good and how much damage was done by the Lane plate? Without its use I believe the limb and perhaps the patient's life would have been lost. That the upper spot of necrosis was encouraged or caused by the screw-hole there can be no question, but in my judgment the damage done is trivial as compared with the good accomplished, and the patient will in time have a serviceable limb.

* * *

NOTE (October 1, 1912).—Patient was thrown while driving a wagon, refractured limb at seat of old injury, and died of septic endocarditis on September 15, 1912.

THE OPERATIONS FOR MASTOID EMPYEMA AND CARIES.

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In the decade since a previous paper on this subject (*American Journal of the Medical Sciences,* April 9, 1902) numerous writings have appeared with diverging views and recommendations, while an experience of some 500 additional operations has still better served to crystallize my teaching on this important matter. The influence of the grippe epidemics seems waning and the acute mastoid cases appear to be less frequent; yet the number of patients in whose behalf such intervention must be considered is enormous. Great differences exist in the clinical material and surroundings of different men. The slum populations offer little opportunity for a conservative attitude, and the crowded hospitals ministering to such localities can ill afford beds except for operative cases—surgeons so environed will naturally operate more promptly than he whose patients promise more for non-operative measures and who has beds in which to treat them expectantly. I have brought through without operation many a patient already shaved, as well as those ordered into hospital for immediate operation, by some other surgeon; but it is probably only from non-experts that I have received cases of furuncular swelling sent for mastoid trephining, although of these cases some are hard to differentiate.

Still more difficult is usually the diagnosis between empyema and caries here—indeed, there are many who make no attempt to distinguish, but holding them equally to demand operation, point to a drop or two of pus found in or near the antrum as proof positive that the case offered no alternative to such radical drainage. Leidy's teaching that the antrum is as much a part of the tympanum as the attic or the lower drum-cavity is only gradually being learned by otologists, persistently as some of us have been insisting upon it. Those who consider every pus-filled cavity an abscess to be torn open, get little chance to learn that the majority of acutely empyematous cavities can successfully drain by their natural channels. The Highmore antrum and other nasal sinuses are being less frequently attacked in their acute empyemas and will be still less opened in the future. Too many have accepted pseudo-authoritative statements that the mastoid can never free itself of pus and have applied them to the "mastoid antrum." The observer who has watched the pus flow from the pharyngeal mouth of the Eustachian tube cannot *prove* that it comes from the antrum or mastoid cells; albeit threatening symptoms there decline in reasonable coincidence, and the patient makes full recovery.

Yet there will be many cases of mastoid empyema in which operation will be called for before any positive diagnosis of caries can be made. The stormy onset of symptoms, the impaired resistance of the patient especially as shown by leucocytosis with high polymorphonuclear count or septic blood-culture, the finding of virulent organisms in culture or smear from the ear—even the limited experience of the surgeon, which forbids his taking risks which another may be justified in running—any of these may demand intervention while the issue is still in doubt. It must be remembered that operation before demarcation has its drawbacks, if not its actually increased risk. There is much in the claim made years ago by Sprague, of Providence, that a mastoiditis must *ripen* before it is best to open it up, if the safest, quickest cure is to be gained; although I must admit that I never wait a needless hour after I have decided that operation is unavoidable. Further, there may be cases in which operation on the mastoid may conserve the hearing, which might be sacrificed by an otherwise successful non-operative care. If this be true, it does not prove that operation could have saved the function in any individual case; but it certainly offers food for thought.

The symptoms of mastoiditis generally include the classic four—heat, redness, swelling, and pain; but any or all of these may be lacking. Most of them are signs of an external periostitis, such as a deep furuncle of the canal may cause; while they may all be absent in a carious affection separated from the surface by a dense layer of normal bone. Under such conditions penetration may take place downward into the diagastric fossa, with all the swelling in the neck. These patients may suffer extensive burrowing of pus along the great vessels; and septicemia generally ends the affection before the pus invades the mediastinum or pericardium, as has been a few times reported in neglected cases. Rupture may take place into the external canal, where swelling and sagging of the wall is in many instances an early and important but not pathognomonic symptom. Too often the line of least resistance is inward, even though other exit is present and seems free. In the majority of my operated cases caries of the inner table has been found, often with notable extra-dural abscess between the affected bone and the granulating dura. This intracranial extension may be into the middle or the posterior fossa, especially often along the sigmoid sinus; but even when extensive I question if it furnishes any symptoms of its own. While many writers have set forth a list of signs of extra-dural abscess, these were absent in scores of cases in my experience, or when found were due to leptomeningitic or cerebral involvement.

Upon the mastoid surface inflammatory signs, even fluctuations, are not unfailing symptoms of caries. Pus may have burrowed out along the canal-wall from the attic and lifted the whole temporal muscle. Edema, even in a severe furuncle, may so simulate fluctuation as to be indistinguishable, at least in a shrinking, unanesthetized patient. One test rarely fails: if the index fingers are pressed upon the swelling until deep pitting has expelled the serous infiltration, even a drop or two of fluid can be felt beneath the periosteum. The fingers should be in vertical line; if one is back of the other, the mobility of the sternomastoid near its insertion may deceive. The canal should be wiped clear before this and studied at once after it, for if all subperiosteal pus can be evacuated into the meatus none may be felt on the surface. This pressure, which may be unbearable to a mastoiditis, proves rather a relief than a torture in furuncle, if exercised without imparting motion to the canal. Tenderness of the mastoid over the antrum or at its tip *is the rule* early in all severe tympanic inflammations—its later appearance is of graver meaning. Edema behind the mastoid may indicate phlebitis of the emissary vein or of the lateral sinus; tenderness here may point to perisinous abscess not yet seriously involving the venous wall. Mere mastoiditis, the painful red swelling of this region, blurring the details of the underlying bone, is commonly a trivial and fleeting matter, as I can attest upon the basis of more than two thousand cases brought to prompt and safe resolution during the past thirty years by rest in bed, hot applications, and rational antiphlogistic means. I have had a dozen such in the past month or two. The temperature, pulse, blood, eye-grounds, and neurologic reflexes, with tests of the facial and acoustic nerves, should almost always tell the experienced surgeon whether he dare treat expectantly or must intervene without delay even in the absence of all pathognomonic signs.

In cases with chronic middle-ear suppuration several additional questions arise. Such patients are described as living over a powder-magazine; but disastrous explosion is the exception, not the rule. Reason, not panic, should dictate our advice. If the case cannot be kept under observation and conservative treatment, a radical attempt at cure is safer than neglect. The operation of tympanomastoid evisceration is successful in perhaps 75 per cent of cases; in some of the remaining 25 per cent the condition is made safer and better; in a few, at least, we meet disaster which had not before seemed imminent. Data are not at hand to decide whether mortality is

greater among the operated or the unoperated patients, although enthusiasts will admit no question that sins of omission are the more heinous. If caries is present in the middle ear it demands intervention; but this may be limited, almost microscopic. Those accustomed to delicate intratympanic work will always be open to accusation of finikin hair-splitting; but their patients thus cured without a dreaded operation will help them to smile at the charge. Cholesteatoma, the formation within the tympanic cavities of laminated masses of epidermis, urgently demands relief; but this may often be conservatively afforded—it is not an invariable indication for radical operation, as has been claimed. It is mainly upon chronic suppuration that sinus thrombosis and brain-abscess supervene, as well as many a disabling labyrinthine caries or fatal meningitis. The "immunizator" will be able to cure some of these cases with his bacterins; many can be conquered by minor measures; some must be radically operated on.

If major operation seems needful, or at least offers the lesser horn of the dilemma, three or more procedures present themselves for choice. The rational surgery of this region demands evisceration of the seriously diseased tissues as well as good drainage. Here, as elsewhere, the "vis medicatrix naturæ" can do much; but the important surroundings endangered make halfway measures too precarious. Even total destruction of the auditory and equilibratory functions must be done at times that life may be saved; but this argument must not be too far-fetched or hysterically applied. Each of us stands in hourly jeopardy of death; but we do not rush to surgery for the removal of every remotely possible contributing factor. We need not amputate the whole temporal bone because of some caries within it, any more than we are called on to remove its fellow, lest it too should become involved. The operation must meet the conditions and be carried as far as the findings lead; it should not be planned as a "complete mastoid operation" that as a blanket-measure shall cover every case—unless like Procrustes we are also to stretch or retrench every patient to fit our operating-table. The old boring into the mastoid for mere drainage would too often prove inefficient as well as too dangerous; I have seen it, demonstrated on the cadaver by a good general surgeon, penetrate the brain, as in the notorious case of Berger, which set back this work for nearly a century. The cortex of the mastoid should be chiseled in thin layers at the point of election until, the antrum having been opened, the pathological need for any further steps has been revealed. This point of election is usually at any softened or fistulous area, or in absence of this at a point about 5 mm. back of Henle's *spina supra meatum* (Fig. 1). Some surgeons have attempted to describe a "postmeatal triangle" as anatomically defined and surgically safe. Only its upper anterior angle is fairly constant, being marked by the spina or the little pit back of it—one or both of these landmarks is almost invariably distinct. A couple of thousand measurements have showed me no instance in which the floor of the middle cerebral fossa came lower than the spina; and there is an average space through which we can chisel to the antrum of 10 mm. between it and the sigmoid sulcus. Yet we must be prepared to find no room for operating at this point, and must so chisel that we shall not wound the dura laid bare at the first stroke (Fig. 2). Schwartze and others have

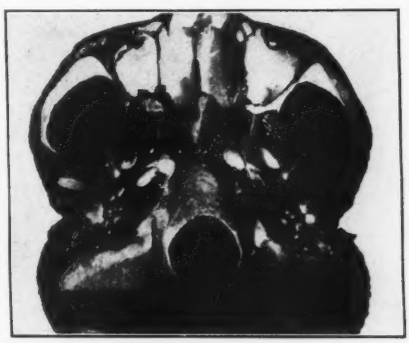

FIG. 1.—Horizontal section of skull showing Henle's spine back of each external auditory canal and its close relation to the tympanic antrum.

described a course of the facial nerve so anomalous as to be here exposed; but I have never seen such a relation; not even in a specimen claimed to demonstrate it. As a rule the facial is out of harm's way until the deeper part of the canal is attacked or we have passed through the antrum to the semicircular and facial canal forming its inner wall.

Chiseling or curetting, the mastoid can be opened to afford needed drainage and to expose for removal all carious bone. This can generally be recognized by sight and touch, but good judgment will often dictate curetting away of bone so evidently infected that it cannot be considered viable; yet I cannot commend except to the inexperienced, who has not learned when to

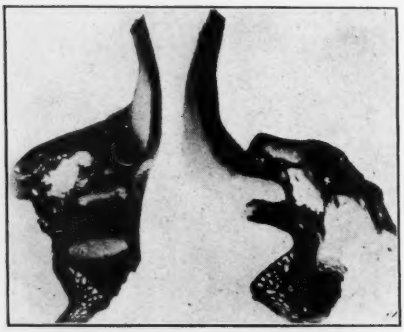

FIG. 2.—Temporal bone horizontally sectioned through upper part of auditory canal, showing sigmoid sulcus almost uncovered at usual operation point just back of spina, on the left side of a dolichocephalic skull.

end his intervention, that he shall "destroy every pneumatic cell of the mastoid and explore the root of the zygoma" for the cells only sometimes found there and much less frequently involved. Caries of the zygomatic cells has been met in hardly one per cent of my operative cases; and I can recall but one, a tubercular man, in whom they later became involved and slightly delayed the healing. Cells not freely drained by the operation may later show infection and retard the cure; but there will be as good reason to suspect that they were infected by the intervention carried needlessly beyond the "acclimated zone" as that they were neglected at the operation. When we consider that the pneumatic spaces of the tubo-tympanic system extend far beyond the mere mastoid, invading any portion of the temporal, even to the *sella turcica,* and may pass back into the occipital or down into its condyle, it is evident that the advice to open every pneumatic cell, whether it shows need or not, entails practical amputation of the temporal. I have never pretended to attempt it; but limiting my work to the tissues that seemed diseased, rarely meet a suggestion that it should have been more radical.

Thus far eviscerated in the acute cases, the mastoid is generally ready for prompt healing, usually under blood-clot and primary closure of the wound; and the suppurative flow through the drumhead at once ceases. Yet where the mastoid caries is due to chronic tympanic suppuration, we long since found that a merely mastoid intervention is inadequate. The tympanum must also be eviscerated if its condition is to be cured and the cholesteatoma formation there brought to an end. For twenty-five years I have been preaching that "cholesteatoma is the cause of chronic otorrhea"—a rule with only enough exceptions to prove its truth. Aural surgery has been dealing more vigorously with these chronic suppurations during this quarter-century, removing the drumhead and ossicles to improve drainage and access, opening out the attic that it may not pocket the process, and, often failing with these, opening the antrum also. They who regard the antrum as a mastoid cell, as the majority still do, see in its involvement a disease of the mastoid, however devoid of mastoid symptoms the case may be; and not content to eviscerate the tympanic cavities, they have been doing "radical cures" by eviscerating mastoid and tympanum alike and throwing all of these cavities into one to dermatize as a large diverticulum of the external canal.

This "tympano-mastoid evisceration" is the proper procedure in mastoid caries due to chronic otorrhea; but it is as irrational to tear out the mastoid in the tympanic case as it would be to eviscerate the tympanum in every mastoid case. The "tym-

panic evisceration" advised by Stacke in 1888 meets the needs of most of the persistent suppurations, and has given me a high percentage of cures in a series of cases grudgingly selected because they had long resisted thorough and vigorous use of measures through the natural passages. Diametrically differing from the Wolff method of opening mastoid empyemas through the back wall of the canal without touching drumhead and ossicles, which Heath of London is now exploiting, this intervention removes the wedge of bone separating the attic and antrum from the canal (the scute, Leidy), together with the drumhead and any remains of malleus and incus, and grafts into the cavity a delicate skin-flap which shall assure and hasten its healing open. Exit is thus given to the cholesteatoma collections, and their matrix is curetted away, carious areas are sought and extirpated, and access is made easy for the future. The operation should not injure the stapes and the healing need not greatly impair its mobility; so a fair amount of hearing is often secured and retained. The curetting is easily extended out into the mastoid so far as there appears any reason to go; no noticeable scarring is left to annoy the most fastidious; and yet the operation can be thorough and of lasting success. For the surgeon not unduly endowed with thumbs, to make room for which he must chisel away the whole undiseased mastoid, or who aims to satisfy himself and not some critic who does not know the case, this "tympanic evisceration" can be ideal.

It is best done by laying forward the soft tissues, including the lining of the auditory meatus, and placing a gouge upon the upper back wall of the naked canal some 10 mm. external to the drumhead, to gently work a notch (such as the boy cuts in his willow whistle) until the attic and antrum are open. Only a bridge of the bone-margin then remains, protecting the deeper-lying facial nerve; this can be thinned until no longer strong enough to be safely chiseled against, when it can be curetted away by outward traction and the evisceration of all three tympanic cavities completed as the diseased conditions demand. The soft tissues corresponding with the bone-gap, which would span it if replaced, are then split into layers, giving a periosteal and a skin-flap each of the full size of the available tissue, and these are lightly tamponed into the cavity, where they quickly cover the walls with a delicate lining of normal skin.

Most men, however, are not content with this, and regard it as finikin and incomplete. They tear out the whole mastoid to convince themselves that it is not carious and regard askance Nature's eburnation there, which has conservatively filled up into solid bone much of the diploic and pneumatic structure; they want more room in which to manipulate, and amputate the whole process lest it later become involved. The large cavity formed can less well be covered in for dermatization by local flaps, especially if these are as usual only half-utilized. Thiersch grafts from the thigh or elsewhere are generally introduced—sometimes by another operation under general anesthesia a week or two later. Three to six weeks is mentioned as the time required for the dermatization; but three months rarely sees the ear more than "practically dry;" and repeated "radical cures" are far from rare or invariably successful. Our clinics are full of the failures, which naturally are far more in evidence than the successes, yet probably constitute quite 25 per cent of all thus operated on. Schwartze, whose experience was huge and his cases followed as is not possible in our large cities, gives the failures as 26 per cent. The aurist conservatively inclined who sedulously employs non-operative methods in these chronic otorrheas, even after they have been urgently advised by others to have evisceration, who builds up their depraved health, uses tuberculin in suitable cases, and shows the patients how to care for themselves, will see many a cure at least as prompt and lasting as operation could have secured; while he will, I believe, see less than the operators, rather than more, of the serious intracranial extensions.

Wholly different is the "tympano-mastoid evisceration" when done for mastoid caries in these chronic suppurations. This is no "operation of election," but with indications which need no hysterics to consider them vital. The inner table of the temporal may be gone and marked pachymeningitis or extra-dural abscess be present; the facial nerve is threatened with permanent injury; the bony labyrinth, if not the membranous, may be already involved and meningitis or brain-abscess really imminent. External symptoms of redness and swelling are far less usual than in the acute lesions; but deep-seated pain, fever, arrested discharge, high polymorphonuclear count, perhaps rigors and vertiginous crises, may plainly forbid expectancy and warn us that if we wait for more localizing symptoms we may be too late. If a concurrent appendicitis or other lesion raises a question of alternative causation of the general condition, it is better to strike both under the same etherization, as John B. Roberts and I have done. The operation should be prompt, exploratory, and thorough as to the disease found.

When there is no question as to the need of eviscerating both mastoid and tympanum there is little advantage in clearing the tympanic cavities first and working out into the mastoid cells; quicker work can probably be done from without inward; and as we may have a very extensive operation before us, no time should be wasted. The mastoid cortex can be opened as in the simple mastoid evisceration until the antrum is entered, then the upper back wall of the meatus chiseled away or bitten out with the rongeur until the "bridge" of tympanic margin is removed, the tympanic cavities emptied of ossicular remains, cholesteatoma and granulations and all diseased surfaces carefully curetted. The Eustachian tube-ending is then scraped—both to secure if possible its healing shut as a bar to future infection from the nasopharynx, and also to destroy the small cells here, which like those at the lower back part of the tympanum are apt to prove lurking-places for the infection. This requires special caution, for the carotid in front and the facial nerve and jugular behind are feebly protected by thin and probably softened bone. The soft tissues are now utilized as plastic flaps toward covering the bare cavity walls, supplemented if desired by Thiersch grafts now or later; all such tissue being best held in place by light tamponing with gauze strips or cotton pellets.

In either form of mastoid evisceration the cutting can be done with the hand-gouge, even in the eburnated bone usually met with in the chronic cases. I practically never use the mallet and cannot hold it innocuous in cases of intracranial involvement. The curetting and chiseling can be done with fair freedom downward and forward; but work up or back should be left until all else has been practically finished, because in both of these directions the dura may be bare through loss of the inner table and even the brain uncovered by dural ulceration. I have found the tympanum already filled by "fungus cerebri." It is not well to bare the dura bunglingly and unawares, for it is too easy thus to injure the brain or the lateral sinus; but I have never seen reason to regret exposing the dura for cause. Even probing may open the lateral sinus, and the surgeon's finger must be ready to close the opening at the first gush and his packing ready to replace and maintain its pressure; but I have yet to see any harm from it beyond the blood-loss. Such an accident generally prevents further intervention for a time, so it is important that other steps be finished before this risk is encountered. Granulations covering the bared dura are doubtless superficially infected, yet they are generally non-absorbing and more protective than the curetted surfaces which would be left by their removal. They should not be covered by skin-flaps, but may be stimulated to healthy condition by packing.

The crux in the cases in which the tympanum is eviscerated is to clean up the infected cavities without doing injury to the facial nerve. This can generally be accomplished by bearing its position well in mind and avoiding it. We know that it

passes just above the oval window, which can usually be located, curves sharply down just back of it, and descends vertically to the stylomastoid exit. This vertical portion passes 2 to 4 mm. behind the middle of the back margin of the drumhead; above this it is internal to that margin, so that the back wall of the canal can be removed thus far with little risk to the nerve. Yet as the canal-axis usually points upward nearly 10 degrees and as much forward, the course of the nerve may seem more oblique, and a slanting ridge of meatus-wall has to be left to protect it. To clean out all the diseased bone or even all that is carious may require us to lay bare the nerve; and only by the most skilfully delicate chiseling can this be done without injury. Merely to lift the nerve left naked by the carious destruction of its canal seems enough at times to paralyze it. The claim can fairly be made that expert operators can uncover the whole length of the facial here and attack diseased bone beyond it with little or temporary paralysis; whereas its spontaneous involvement is more apt to leave permanent disability. So sins of omission may be worse for the patient than unfortunate but rational zeal to complete the evisceration. To watch the face of the patient seems an inefficient substitute for knowledge of the anatomy; its twitching often marks the completion of the injury.

Paralysis of the face may follow a perfect operation if the packing of the wound press unduly upon the facial; it is more often a neuritis than a severing of fibers. Recovery is the rule, but with slow return to perfectly simultaneous and equal action of the two sides, and can be greatly aided by persistent light pinching of the affected muscles. This can be done from the first and maintains the vitality of the nerve-endings, when it is not yet safe to use electricity. I have seen recovery, far surpassing any results from anastomosis, thus obtained after four years of persistent paralysis.

RESULTS OF EXPERIMENTS ON VARIOUS BONE-PLATES APPLIED TO FRACTURED FEMORA IN THE CADAVER.

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Because of repeated complaints noted in the literature on the subject, and at the suggestion of Dr. Edward Martin, a series of experiments was made to test the efficiency and strength of the Lane bone plate. The idea was to determine the weak points in this method of fixation of bone fragments. To find the amount of strain the plates, screws, and bone would withstand, comparing various-sized plates, various-sized screws, and various-sized screw-holes, has been the endeavor of this work, which, however, is not to be considered as a final contribution, but merely as a preliminary statement of a few facts determined.

The work was done on femora of cadavers of a diameter of one inch, which were fractured transversely, at the middle of the shaft. The soft tissues and periosteum were freed from the site of the plates, which were applied in several different positions on the bone shaft. In testing the strength of the union, the knee was splinted to prevent flexion, and the force measured by a spring scale applied on the foot, thus using the extremity distal to the fracture as a lever with the fulcrum at the site of the fracture. Different forces were exerted in varying directions until the artificial union gave way. Note was then taken of the conditions found.

In the first series the ordinary Lane plate was used. Twenty-four plates were acquired, guaranteed hand-forged crucible steel. The screws were No. 6 threaded to the head, their barrel being the size of a No. 32 twist drill.

Plate No. 1: Two-hole plate applied anterolaterally externally with ⅞-inch No. 6 screw, hole drilled with a No. 32 twist

drill. The screws were one-fourth inch from the fracture. The direction of strain was toward adduction, and it required 10 pounds pull to disrupt the union. The bone broke out from the screw-hole into the fracture.

Plate No. 2: Two-hole plate applied anteriorly with ½-inch No. 6 screw, No. 32 drill. Force was applied posteriorly, and the union withstood the weight of the extremity plus 20 pounds pull before the plate bent and the screws pulled out. Here the transverse character of the fracture prevented sufficient angulation of the plate to cause a break. In other words, the strain was a longitudinal one on the plate.

Plate No. 3: Four-hole plate, applied anterolaterally externally with No. 6 screws, ⅞-inch long, No. 32 drill. Force applied in abduction required 12 pounds to bend the plate and 14 pounds to break the plate, which broke in the screw-eye just distal to the fracture. The screw held tight.

Plate No. 4: Four-hole plate applied anterolaterally externally with No. 6 screws, ½-inch long, applied in same holes as in plate No. 3. Force applied in abduction required 16 pounds to bend and 21 pounds to break the plate, which broke in the screw-eye just distal to the fracture site. The screws held tight.

Plate No. 5: Four-hole plate applied anterolaterally externally with No. 6 screws ½-inch long, applied in same holes as plates Nos. 3 and 4. Force was applied in abduction, requiring 12 pounds to angle the plate and 16 pounds to break it through the screw-eye. The screws were slightly loosened.

Plate No. 6: Four-hole plate, No. 6 ½-inch screws applied in same holes as in plates Nos. 3, 4, and 5. Force applied in abduction required 12 pounds pull to angle the plate and 16 pounds pull to break the plate through the screw-eye next the fracture. The screws were loosened, but held sufficiently to break the plate.

Plate No. 7: Four-hole plate, No. 6 ½-inch screws, applied in same holes as plates Nos. 3, 4, 5, and 6. Force applied posteriorly. With the weight of the extremity a 4-pound pull broke the plate. The screws were much loosened, but held to point of breaking the plate, although they could easily be angled out of place later.

Plate No. 8: Conditions identical with plate No. 7, requiring 3 pounds pull plus the weight of the extremity to break the plate in the same relative place. Screws held firmly.

Plate No. 9: Conditions identical with plate No. 8, with exception that the screws were applied in new No. 32 holes. Three pounds pull plus the weight of the leg broke the plate in the screw-eye, next the break in the bone. Screws held firmly.

Plate No. 10: Four-hole plate applied anteriorly with No. 6 screws, No. 32 drill. Force applied directly posteriorly—that is, in a direction just opposite to the side of the plate—required 25 pounds pull plus the weight of the extremity to break the plate, which broke through the screw-eye just distal to the bone fracture. Screws held firmly.

Plate No. 11: Eight-hole plate, anterolateral external position, with ⅞-inch No. 6 screws. Force of 20 pounds plus the weight of the leg broke the plate through the screw-eye. Screws held firmly.

Plates Nos. 12 and 13: Four-hole plates, applied one anteriorly and one lateroexternally, with ½-inch No. 6 screws in No. 32 drill-hole. Posterior pull of 25 pounds plus the weight of the extremity caused no give in the union. Lateral pull toward the lateral plate side required 16 pounds pull to break both plates through the screw-eyes just distal to the fracture site.

Plate No. 14: Four-hole plate applied anteriorly with ½-inch No. 6 screws, same holes as plate No. 12. Force applied in adduction required 15 pounds to break the plate through the same corresponding screw-eye.

Plate No. 15: Four-hole plate applied anteriorly with ½-inch No. 6 screws in same holes as plates Nos. 12 and 14. Force applied in rotation, or twisting with foot as a lever on the long axis of the bone, re-

quired 50 pounds pull to rotate to 180 degrees. Screws loosened slightly, but held until further rotation broke the plate through the screw-eye.

Plate No. 16: Four-hole plate applied anteriorly with 1-inch No. 6 screws in No. 32 drill-holes. Force applied posteriorly with the weight of the leg required ten pounds to break the plate in usual place.

Plates Nos. 17 and 18: Four-hole plates applied anteriorly and anterolaterally with 1-inch No. 6 screws in No. 32 holes. Force applied in rotation to 180 degrees required 50 pounds pull with the foot as a lever to split the bone.

Plates Nos. 19 and 20: Four-hole plates applied anteriorly and anterolaterally with one-inch No. 6 screws. Force applied in rotation required 50 pounds pull, with the foot as a lever to cause 180 degrees rotation, twisting the plate with some loosening of the screws, but they held until the bone split.

Plate No. 21: Four-hole plate applied anteriorly with No. 6 screws 1 inch long in No. 32 drill-holes. Force applied anteriorly broke the plate when merely elevating the extremity by lifting by the toes.

Plate No. 22: Eight-hole plate applied anterolaterally with ½-inch No. 6 screws in No. 32 hole. Force applied in rotation required 50 pounds pull to destroy the union by splitting the bone. The screws held and the plate was twisted on its long axis, the bone breaking before the strain was sufficient to break the plate.

TABULATION.

Plate.	Number of screws.	Length of screws.	Position of plate.	Number of plates.	Direction of force.	Amount of force in pounds.	Effect on the plate.	Effect on the screws.	Effect on the bone.
1	2	⅞ in.	Anterolateral external.	1	Adduction.	10 lbs.	.....	.....	Broke out through screw-hole.
2	2	½ in.	Anterior.	1	Posterior plus weight of extremity.	20 lbs.	Bent.	Pulled out.	.....
3	4	⅞ in.	Anterolateral external.	1	Abduction.	12 lbs. 14 lbs.	Bent. Broke through screw-eye.	.....	.....
4	4	⅜ in.	Anterolateral external.	1	Abduction.	16 lbs. 21 lbs.	Bent. Broke through eye.	.....	.....
5	4	½ in.	Anterolateral external.	1	Abduction.	16 lbs. 12 lbs.	Bent. Broke through distal eye.	Slight loosening.	.....
6	4	½ in.	Anterolateral external.	1	Abduction.	12 lbs. 16 lbs.	Bent. Broke through eye.	Slight loosening.	.....
7	4	½ in.	Anterolateral external.	1	Posterior plus weight of extremity.	4 lbs.	Broke through the eye.	Markedly loosened, but held.	.....
8	4	½ in.	Anterolateral external.	1	Posterior plus weight of extremity.	3 lbs.	Broke through the eye.	Markedly loosened, but held.	.....
9	4	½ in.	Anterolateral external.	1	Posterior plus weight of extremity.	3 lbs.	Broke through the eye.	Markedly loosened, but held.	.....
10	4	½ in.	Anterior.	1	Posterior plus weight of extremity.	25 lbs.	Broke through the eye.	.....	.....
11	8	⅞ in.	Anterolateral external.	1	Posterior plus weight of extremity.	20 lbs.	Broke through the eye.	.....	.....
12	4	½ in.	Anterior.	2	Posterior plus weight of extremity.	25 lbs.	No effect.	.....	.....
13	4	½ in.	Lateral.	2	Anterior.	16 lbs.	Broke both through eye.	.....	.....
14	4	½ in.	Anterior.	1	Adduction.	15 lbs.	Broke through eye.	.....	.....
15	4	½ in.	Anterior.	1	Rotation 180°	50 lbs.	Twisted.	Slightly loosened.	.....
16	4	1 in.	Anterior.	1	Posterior.	10 lbs.	Broke through eye.	.....	.....
17	4	½ in.	Anterior.	2	Rotation 180°	50 lbs.	Twisted.	Loosened, but held.	Split through screw-holes.
18	4	½ in.	Anterolateral external.	2	Rotation 180°	50 lbs.	Twisted.	Loosened, but held.	Split through screw-holes.
19	4	1 in.	Anterior.	1	Rotation 180°	50 lbs.	Twisted.	.....	Split through screw-holes.
20	4	1 in.	Anterolateral	1	Rotation 180°	50 lbs.	Twisted.	.....	Split through screw-holes.
21	4	1 in.	Anterior.	1	Anteriorly.	Weight of extremity.	Broke through eye.	.....	.....
22	8	½ in.	Anterolateral	1	Rotation.	50 lbs.	.....	.....	Bone broke.

Trials were next made with the No. 6 screw in different sized holes in bone. Drills of sizes Nos. 28, 29, 30, 31, 32, 35, and 37 were employed and screws inserted in each size hole. This was repeated in fresh holes several times, and force then applied to the screws in an endeavor to extract them. In the larger holes, Nos. 28, 29, and 30, the screws invariably pulled out, bringing the threaded bone with them. In Nos. 31 and 32 holes the screws never pulled out, but rather either broke the shaft of the bone or the screws themselves broke off. Preference is given the No. 32 hole, as the screws fitted more snugly. In holes Nos. 35 and 37 the screws fitted too tightly, as was evidenced by the fact that several of them were twisted off in endeavoring to drive them home with the screw-driver.

CONCLUSIONS.

1. The Lane plate of crucible steel breaks consistently through the screw-eye just distal to the fracture site.

2. One-half-inch screws engaging one side of the cortex are sufficient.

3. Four-hole plates hold as well as eight-hole plates.

4. The plates break before the screws pull out.

5. The screws should not be placed nearer the fracture than half an inch, if it can be avoided. Screws placed one-fourth inch from the fracture break out.

6. Twisting of the bone to 180 degrees causes a torsion of the plates and slight loosening of the screws; later a split in the bone.

7. A No. 32 twist drill is the proper size for drilling the holes.

8. The union as a rule (one exception) readily bears the weight of the extremity.

9. The average pull (in pounds on the foot) required to break the plates was 14 5/9.

10. Two plates make a much stronger union than does one plate.

11. The plates tested varied widely in the amount of strain they stood before breaking.

The above leads one to believe that the weakness of the union is in the plate. With this in view, plates were obtained with reënforced screw-holes, made of crucible steel.

Plate No. 23: Under same conditions as in the above series the plate broke with a pull of 16 pounds. The break occurred through the shaft of the plate.

Plate No. 24: Under same conditions broke through the shaft with a pull or strain of 16 pounds.

Plate No. 25: Under same conditions broke with pull of 14 pounds.

It was obvious that this modification of the plate did not give sufficient added strength, and consequently a better steel was sought.

Through the kindness of Pierce & Company, Philadelphia, some plates were obtained made of vanadium steel and with reënforced screw-holes, but of the same or slightly less thickness than the crucible steel plates. They were tested on the cadaver and also in a vise. In the cadaver the same conditions were adhered to as in the former tests. Some of the plates were of stock vanadium steel and others were of "G" vanadium, made, I believe, with more vanadium in its composition, especially for use in bone plates.

Plate No. 26: With a "G" vanadium plate of four holes, fixed with ½-inch screws in anterolateral position, the union held until, with a posterior pull of 50 pounds and the weight of the leg, the femur broke.

Plate No. 27: A "G" vanadium plate of four holes, fixed with ½-inch screws in anterolateral position, was bent by a pull averaging 45 pounds, at right angles in three directions, and no break occurred, nor did the screws pull out.

Plate No. 28: A "G" vanadium of four holes, under similar conditions as the last plate, acted in a similar manner and did not break.

Plate No. 29: A "G" vanadium placed in a vise, to the middle of its shaft, bent under 32 pounds strain to an 80 degree angle. It required bending backward and

forward six times through an angle of 160 degrees before the plate broke.

Plate No. 30: A "G" vanadium, under same conditions as the last plate, withstood bending to 80 degrees each way—that is, 160 degrees four times—before it cracked.

Plate No. 31: Stock vanadium required 36 pounds strain to bend it and 45 pounds to continue the angulation to 80 degrees. Bending back caused a fracture through the shaft.

Plate No. 32: Stock vanadium bent with 37 pounds pull to 80 degrees, but broke through its shaft on the second bending.

A greater number of vanadium plates were not experimented with because it was impossible to get any more, as they were not on the market at the time. However, I think that even from this limited number we can draw more or less definite conclusions, as follows:

1. Vanadium stock steel is slightly more rigid than "G" vanadium, but does not stand repeated bending.

2. The "G" vanadium plates stand repeated bending through an angle of 160 degrees before finally breaking.

3. One-half-inch screws held during repeated bending of the plates, but loosened somewhat.

4. In a transverse fracture with the force applied opposite to the plate, the union held and the bone broke (one case).

5. Repeated bending finally caused a loosening of the screws.

6. The "G" vanadium plates required angulation from three to six times through 160 degrees before breaking.

7. The "G" vanadium plates required approximately twice the force to bend them as was required to bend the crucible Lane plate.

Summing up the above data on all three types of plates, we are led to believe that a "G" vanadium plate with reënforced screw-eyes, accommodating four No. 6 screws one-half-inch long, threaded to the head, in a No. 32 drill-hole, gives the strongest union.

THE THERAPEUTICS OF VERONAL.

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Veronal is being more and more extensively used and abused. It is prescribed by physicians in an increasing variety of cases. The druggist dispenses it freely and the layman has learned to ask for it. Harm mingles with the good it does. This state of affairs seems to justify the present paper.

My original paper on veronal[1] was based upon the administration of more than 3000 doses given to about 200 patients, at least one-half of them insane, and the remainder victims of lesser disorders of the nervous system such as neurasthenia, alcoholism, and drug habits, treated over a period of three and a half years in a private sanatorium. In institutional work, because of the constant attendance of nurses, the field of drug hypnotic therapy is broader than in private work, for in the latter greater caution must constantly be exercised if one would avoid the dangers of self-medication and drug habituation.

During the last six years I have prescribed veronal more sparingly. Most of my cases have been in private neurologic practice and have included practically every complaint accompanied by insomnia or nervous restlessness. Certain modifications in what my surgical friends might speak of as the "technique" of administration have resulted, together with the broadening of the possibilities of the drug on one hand and a better appreciation of its limitations and contraindications on the other.

Review of Physiological Action.—The average dose of veronal necessary to cause sleep is 7½ grains. In normal individuals,

or those who suffer from mild forms of insomnia only, this quantity will induce quiet sleep in from twenty to forty-five minutes. In those who suffer from more severe forms of insomnia a larger quantity may be needed—up to 15 grains being a physiological dose in reasonably robust patients. Sleep lasts eight to twelve hours. A small proportion of patients, especially elderly ones, experience slight vertigo on rising, apparently due to reduction in the blood-pressure which seems to be a common result of veronal administration. It quickly disappears after the morning cup of coffee. In susceptible persons sleep may last twelve hours or more. In such persons sleep is so sound that it is often possible to raise the eyelids without disturbing them. During sleep the heart is a little slower than normal, and respirations may seem a bit shallow.

The skin may be pale but is never cyanosed, as so often happens from chloral. The pupils are dilated but react to light.

Rarely a susceptible patient will suffer from dizziness after a single dose of veronal as small as five grains. After prolonged daily use certain patients suffer vertigo, weakness in the legs, and lessening of physical activity. This in itself in violent and disturbed patients may be a desirable result. In time the urine may become scanty and dark. I have examined many specimens from patients who were using frequently repeated doses over long periods and have never found albumin or sugar. In patients who suffer from delirium, or mania, or who are in a state of mental hebetude, the tendency to ignore bodily functions may be increased. Thus occasionally urinary retention occurs and serves as an indication to substitute some other method of causing sleep.

Therapeutics.—All hypnotic medication has limitations which should be borne in mind. No hypnotic should be given carelessly or in cases in which sleep can be induced without its aid. Many persons are susceptible to drug influences and easily converted into drug habitués. To such persons hypnotics should rarely be given. With these reservations, peculiar to every drug of its class, veronal may be given to any patient needing a hypnotic, except such as are wakeful because of pain. Veronal fills all the indications which in past years were met with chloral, but with infinitely less danger, either immediate to life or the formation of a drug habit. Its realm includes insomnia, intense restlessness of mind and body, as in mania and alcoholic delirium, and extreme mental pain such as occurs particularly in severe melancholia. In addition to producing sleep it serves the purpose of quieting patients, so that they will find time to eat or will overcome their inhibitions and delusions and eat sufficient to maintain strength.

Special Indications.—For the insomnia of neurasthenia, when properly given, veronal induces restful sleep. In certain cases it is delayed in acting, and patients lie awake or doze the early part of the night, and are dull and sleepy next day. This may often be prevented by administering a preliminary dose, one-third or one-half the entire amount to be given, at five o'clock, and the balance at bedtime. The first dose will then be ready to act, and sleep will, as a rule, come quickly after the second. By morning the effects of both doses will have passed off, and the patient may be expected to be free from sleepiness during the day.

Neurasthenics, because of their constant self-examination, should be guarded from the dangers of self-medication. For this reason, when possible, it is well to give veronal to the nurse or other responsible person, prescribing it in small powders (3 to 5 grains) and ordering only as many as may be needed, without permitting the patient to know either the name or the amount of the drug so given. After a few nights' sound sleep the dose may be lessened without the patient's knowledge and again increased as indications arise. Though necessary to guard against dangers, it must not be forgotten that, in many neurasthenics, the imperative need of sleep must be gratified by efficient hypnotics. Especially in

elderly persons, continued insomnia is infinitely more dangerous than are the effects of any of the milder hypnotics now so commonly used.

To *psychasthenics* (cerebral neurasthenics), who present few physical symptoms and who require only an occasional hypnotic, I often dole out the powders one or two at a time, sufficient only for one or two nights' rest, and make the patient call for more when needed. By this means the tendency to excessive medication is prevented and the patient is obliged to use every reasonable means, psychic and otherwise, to induce sleep without drugs. Neurasthenics and psychasthenics often sleep from doses as small as 4 or 5 grains.

In acute *alcoholism*, veronal replaces chloral and frees patients from the extraordinary danger of that drug. Caution should be used not to overdose, and veronal should be used only to supplement the customary bromide and gentian. Much disturbed patients will often sleep from 15 grains of veronal, and, if bromide be given freely on awaking, will rapidly improve. The second night 10 grains may be sufficient, the third night 5 grains, and the fourth night none will be needed, providing alcoholics have been discontinued, and substitutes therefor (*e.g.*, hot milk and capsicum) administered at regular intervals.

The intense activity of *mania* will often cease if veronal be administered. Five grains, repeated every four to eight hours, may be used over fairly long periods, without harm. *Melancholics*, who would otherwise have to be fed with a tube, eat freely under its quieting influence.

Paretics, otherwise unmanageable, can often be kept quiet by veronal. I succeeded in keeping one such patient at home for two years, after he had kept a sanatorium constantly excited by his quarrels and fights. While under the influence of veronal, which he took willingly, as he partly realized his mental state, he was quiet, tractable, and controllable. When free from it he fought frequently.

In the withdrawal treatment of *morphinism* or *cocainism*, veronal is the best temporary substitute I have yet found.

In *hysteria* it is an excellent substitute for bromides, which are often refused because of their salty taste and irritating effects on the stomach. And it will often control patients who do not respond to bromides at all.

Chorea has been added to the list of diseases in which veronal may be of value. A recent patient was a child of nine whose violent contortions were partly controlled by 3-grain doses, after bromide had failed. The suggestion of its value here remains tentative.

For the relief of *vomiting of pregnancy* Reich and Herzfeld[2] have used veronal with excellent results. It has been recommended and used with some success to relieve *seasickness*.[3-4]

I have tried veronal in epilepsy, but have found it valueless, except to relieve the maniacal outbursts which occasionally occur.

Contraindications.—Because of the tendency of veronal to darken the urine, it seems to me that *acute nephritis* is an absolute contraindication. Chronic nephritis with pale, abundant, albumin-free urine, is not a contraindication to moderate occasional veronal dosage. *Extensive heart disease*, especially aortic regurgitation, is probably a positive contraindication. Milder forms of heart disease contraindicate continued rather than the occasional use of veronal; though in the presence of heart disease of any degree it is wise to give any hypnotic cautiously.

Veronal ought never to be used to relieve *insomnia* due to *pain*. Only enormous doses will cause sleep, which will even then be disturbed. Opium or the coal-tar derivatives will prove more satisfactory in such cases.

Elderly persons often experience vertigo following veronal, and with them it should be tried cautiously at first. Trional may be as effective and seems to cause less after-effects in the aged. If trional fail, veronal may be given, at first in small doses, which can be increased if necessary. Staggering,

vertigo, weakness, etc., will indicate the wisdom of withdrawing the drug.

It is probable that persons of any age in whom blood-pressure is below the normal ought not to be given veronal if results can be obtained from other sedatives.

Toxic Symptoms.—A number of deaths have been reported from large doses, usually above 100 grains. My own experience indicates that a single dose of 30 grains may cause danger symptoms, though I know of a frail, melancholic girl who received from 20 to 35 grains in divided dosage every day for two months, and seemed to thrive on it.

Cumulative effects of almost any hypnotic drug given by the mouth sometimes occur. Veronal is no exception, and aged patients may collapse from repeated dosage which was at first ineffective.

Toxic symptoms are vertigo, diplopia, staggering, dark, scanty urine, sometimes with retention, feeble pulse, shallow respiration, and gradual development of coma, increasing until death closes the scene.

Dermatitis[5-6] has been reported in a number of cases, but appears to be limited to elderly patients.

Incompatibility.—The following case indicates a possible drug incompatibility which I have observed:

An emaciated girl of twenty-four, suffering from melancholia, who had eaten but little food for six weeks and only when forced, was restless, moaning, and unable to sleep. At my first visit I ordered 5 grains of veronal at 5 o'clock, to be followed by 10 grains six hours later. She slept soundly, and on awaking ate better than in weeks. The relatives were highly pleased, and next morning, in telling me of the condition over the phone, said the patient was badly constipated. Calomel and soda, to be followed by an enema, were ordered, and the nurse directed to give no other medicine until the bowels had been thoroughly emptied. That night the patient was again restless, and without orders was given 15 grains of veronal. She sunk into a quiet sleep, but the next morning could not be aroused. I found her semicomatose, with shallow respirations and feeble, rapid pulse. She could be aroused only sufficiently to answer yes or no to questions, and would again become half-comatose. She was fed for two days by means of a nasal tube. During that time the excretion of urine was limited to a few ounces drawn with a catheter. Her skin became dark yellow. Notwithstanding the use of stimulants she became more and more feeble, and died during the third day.

I regarded this case as probably hopeless from the beginning, yet think that death was hastened by the veronal, but believe the calomel equally responsible because of its exhausting and depleting influence. Since then I have observed a number of patients who were depressed when these drugs were given near together, and believe that veronal ought not to be administered until the effects of the calomel have disappeared, and *vice versa.*

How long may veronal be safely given? This is an important question not easily answered. I have in mind many neurasthenics who have taken the drug over months. A physician took veronal in 5- to 10-grain doses almost every night for more than a year without ill effects, and at the end of that time, having recovered from his neurasthenic state, was able to discontinue it without effort. Another physician who took a fluid preparation for several months suffered severely for a week, when the medicine was withdrawn. Any hypnotic drug is unsafe if given to a patient without control by others; but if given in charge of a nurse and suitable precautions observed, veronal may be administered with safety over many weeks. The symptoms which indicate that it should be discontinued are vertigo, weakness and staggering, puffy eyelids, and above all else dark, concentrated urine. When this appears the drug should be discontinued and a mild diuretic substituted. If, for any reason, it seems wise to give veronal over any continued period, it is my practice to give spirit of nitre and acetate of potassium in small doses during the day, and the dark urine quickly disappears. All patients who

require hypnotics over continued periods should be given relief from possible toxic effects by the substitution of other forms at intervals of a week or less, and if this rule be followed veronal may be continued over long periods without evil effects.

Treatment of Poisoning.—If it be suspected that the stomach contains any unabsorbed veronal, no hot drinks should be given as these will hasten absorption. Instead the stomach tube may be used. As soon as danger from this source has passed, hot coffee or tea should be given freely, by feeding tube if necessary. Nitroglycerin by mouth or hypodermically will serve to stimulate and aid in increasing renal activity. External heat should be applied.

Caffeine may be used, but there appears to be no indication for strychnine or digitalis, as the heart is apparently not affected. As soon as immediate danger is over, diuretics, especially potassium acetate and spirit of nitre, should be given as they serve to aid renal activity, which is always diminished in veronal poisoning.

Administration and Dosage.—Veronal will give best results when prescribed in powder form. I am vigorously opposed to the use of tablets containing it, for the reason that I have never been able to get results from them, and attribute this either to substitution, to some influence of the excipient, or to the increased insolubility of tablets generally. Secondly, I object to tablets because they favor self-medication.

Fluid preparations are equally objectionable for the reason that they can be prepared only with the aid of ether. The only true veronal habitué I have yet observed was taking a fluid preparation and undoubtedly getting most of his pseudo-pleasure from the ether it contained. To get 8 grains of veronal from most of the fluid preparations necessitates the use of four drachms of fluid, enormously increasing the cost of the drug, lessening its efficiency, and giving an appreciable quantity of ether.

For the relief of simple insomnia, 5 to 15 grains of veronal may be given, divided if preferred, part being given at 5 or 6 o'clock and the balance on retiring. For sedative purposes 5 grains may be given every four to six hours during the day and a double dose at bedtime. Probably the maximum quantity in twenty-four hours ought not to exceed 30 grains. Hot malted milk remains the best vehicle. It disguises the taste, acts as a solvent, is itself sedative to many persons, serves to conceal the quantity administered, making reduction in dosage possible without the patient's knowledge, or, conversely, for unwilling patients, making concealment possible. As a substitute hot water or weak tea serves well.

To those who suffer from vertigo and slight headache after veronal, Van Noorden[7] has recommended that the dose be reduced and phenacetine in 3-grain doses added. He thinks this combination most effective and desirable.

To delirious patients and those who refuse to take food, the drug may best be given in food administered by means of a nasal tube. Medication by rectum is too unreliable in these cases as everything is expelled promptly. Many times if sedatives be given through the nasal tube the patient will take both food and drugs normally when once quieted by the first dose.

SUMMARY.

Veronal Indications.—Insomnia and extreme nervous restlessness. Specifically, neurasthenia, psychasthenia, acute alcoholism, maniacal excitement, epileptic mania, paresis with excitement, extreme melancholia, especially with suicidal tendencies or refusal of food, withdrawal treatment of morphinism and cocainism, hysteria, and probably seasickness, severe chorea, and vomiting of pregnancy.

Contraindications.—Acute nephritis, extensive heart lesion of any kind, especially myocarditis and aortic regurgitation, insomnia due to pain.

Partial Contraindications.—Use cautiously in any condition in which urine is dark and scanty, chronic interstitial nephritis, heart lesions fully compensated; old age, in which it may be invaluable, but should be tried cautiously at first; any condition in which blood-pressure is abnormally low.

Incompatibility.—Clinically veronal appears incompatible with calomel if administered near together.

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TREATMENT OF SYPHILIS BY SALVARSAN.

MITCHELL (*Edinburgh Medical Journal*, February, 1913) on the basis of 350 injections of salvarsan draws the following conclusions:

Salvarsan has the most striking and rapid effect on all the clinical manifestations of syphilis.

Salvarsan produces a more rapid change in the Wassermann reaction than mercury.

The period of infectivity is greatly reduced by the disappearance in a few days of all spirochætæ from the superficial lesions.

The dangers of death, blindness and other nerve lesions have been grossly exaggerated.

He strongly recommends the routine use of salvarsan in conjunction with mercury in all stages of syphilis, beginning with an intravenous injection of salvarsan and following it with a course of mercury, and, if necessary, repeating the salvarsan injection.

The intravenous route is the only satisfactory method.

Treatment should be controlled throughout by the Wassermann reaction.

It has a striking effect on lesions that have resisted mercury.

The use of neosalvarsan is extremely dangerous on account of its great instability.

Bad effects are due to faulty preparation and administration.

The clinical corroboration of his statement as to the great danger of neosalvarsan seems to be wanting. In this relation the report of Ballinger and Elder, quoted in the *Annals of Surgery*, February, 1913, is of interest. They have given 285 injections of "914" or neosalvarsan, and believe it to be superior to "606" for the following reasons: It has only to be mixed with water and is then ready for the injection. Very slight disturbance of the patient is produced by its injection intravenously—nausea, vomiting, chill, and fever being unusual complications. Repeated injections cause practically no reactions, and the treatments are not objected to by the patients. The mildness of the symptoms produced allows of the administration of full doses with more impunity than was the case with "606;" therefore with larger doses, repeated at shorter intervals, we may hope for more complete cures and few, if any, recurrences. The practical perfection of the drug as it is placed on the market will probably result in more uniformly satisfactory results from neosalvarsan than resulted from salvarsan. Patients who have received both preparations have expressed a decided preference for neosalvarsan.

The doses given to male adults were 0.75 to 0.9 gramme of neosalvarsan, a quantity equal to 0.5 to 0.6 gramme of salvarsan, at the first injection, and the same dose or a larger one was given every two or three days until three or four injections were administered. A month was then allowed to elapse and the treatment repeated. Again at the end of the next month a single full dose should probably be given. If the Wassermann reaction remains negative, no further treatment will be necessary, and the writers have so far not been required to supplement their treatment with mercury. The technique described by Ballinger and Elder consists essentially in making a minute puncture through the skin over a distended vein with a small pointed instrument, and plunging the injecting needle through this small puncture directly into the vein. They have made 695 consecutive intravenous injections without making an incision to expose the vein in a single case.

EDITORIAL.

THE THERAPEUTIC VALUE OF ARTIFICIAL PNEUMOTHORAX.

In the Progress columns of this issue of the THERAPEUTIC GAZETTE we print an abstract of an article in the *Quarterly Journal of Medicine* by Rist, the general trend of which is to indicate that the production of artificial pneumothorax in cases of pulmonary tuberculosis is not to be feared, and that it does good in a sufficient number of cases to justify its induction if the condition of the lung is peculiarly suited to this method of treatment. As he well points out, it is practically impossible to give a statistical account of the results obtained by the various clinicians who have resorted to this method, chiefly because the standpoint of each observer has been somewhat different, conditions in the patients have rarely been exactly similar, and the period of observation before results were reported has varied from a few weeks or months to several years.

By a curious coincidence Hamman and Sloan contribute to the February issue of the *Bulletin of the Johns Hopkins Hospital* an exhaustive article upon the same subject. They point out that rest has long been accepted as an important condition for the recovery of inflamed tissues, and that in tuberculosis in particular its enforcement has given brilliant results. So, too, cases are numerous in which the effects of a pleural effusion, complicating a tuberculous lesion in the lung, have seemed to be advantageous so far as this lesion was concerned rather than disadvantageous, since with the onset of the effusion there is a diminution of fever, of cough and expectoration, and a general improvement in health; whereas, on the other hand, aspiration of the transudate was followed by a recurrence of the previous symptoms, which diminished in turn as the fluid reaccumulated. Indeed, some observers have gone so far as to suggest the injection of sterile irritant substances into the pleural cavity with the object of increasing and prolonging the effusion, and Hamman and Sloan quote Galliard as giving the name "Providential pleurisy" to effusions of this kind. Incidentally, these observations should impress upon our minds the fact, not sufficiently recognized, that it is often the duty of the physician to leave such an effusion alone unless he can be certain that its existence is producing discomfort and damage.

So far as pneumothorax is concerned it is interesting to note the difference between the danger of pneumothorax when it occurs by accident or as a complication of advanced pulmonary tuberculosis, and pneumothorax which takes place through the instrumentality and wish of the physician. The death-rate in the former condition has been considered 100 per cent by some observers, and not less than 71 per cent by others; whereas artificial pneumothorax seems to be almost safe. Pneumothorax occurring as a complication is undoubtedly dangerous, and the reason assigned by Hamman and Sloan for this extraordinary variation in result is that the pneumothorax which complicates tuberculosis is a terminal condition in a patient worn by advancing disease, and furthermore it is almost constantly associated with pleural infection. In all probability the chief cause for its fatal result lies in the fact that when a perforation of the visceral layer of the pleura occurs, each inspiration pumps into the pleural cavity a volume of air which is unable to escape, so that in a very short time an exceedingly high pressure is induced in that side of the thorax, which seriously interferes with compensatory respiration on the healthy side, and causes disastrous pressure upon the heart and great vessels. This is probably the explanation of the fact that traumatic pneumothorax is so often fatal, even when there is no tuberculous lesion. Furthermore, the side upon which the pneumothorax does not develop is not infrequently also infected, and therefore is incompetent to take up compensatory breathing. Again, when the physician

introduces air or gas into a pleural cavity he controls the quantity injected and takes care that the lungs and surrounding tissues are not subjected to undue pressure.

It will be recalled that as long ago as 1882 Forlanini recorded a number of cases in which improvement followed spontaneous pneumothorax complicating pulmonary tuberculosis, but it was not until ten years later that he began to employ artificial injections, and not until 1895 that he reported a cure of a far-advanced case of pulmonary tuberculosis in which collapse of the lung had been induced by the injection of nitrogen gas. Three years later Murphy, apparently without knowledge of Forlanini's observations or experiments, advised the same plan, but after a very brief trial, in which the results were apparently good enough to save the method from ostracism, it passed almost entirely out of use, only to be regenerated in 1906 by Brauer.

It must be evident to every one who regards this matter even superficially that such a plan of treatment must be limited in its application to a comparatively small number of cases. It goes without saying that those instances in which only one lung is affected must be much more favorable than those in which there are lesions in both lungs. It must also be evident that many physicians would be willing to resort to this method only when conditions were so desperate that climatic and other methods seemed hopeless, and under these circumstances both lungs are usually involved. To immobilize one lung by compressing it and simultaneously to overexercise the better but nevertheless diseased opposite lung is paradoxical—at least it would seem so at first glance, since the position might well be taken that if rest is good for one side it is good for both. We think, however, that this paradox is more apparent than real, since it is well known that in certain conditions of the lung which is affected by tuberculosis, increased activity and improved circulation are advantageous rather than otherwise. If this were not so the results obtained by patients going to high altitudes, where increased pulmonary expansion is a necessity, would not obtain the benefit which so often accrues. Murphy's opinion was that this method was indicated in apical and monolobar disease in its early stage and contraindicated in advanced or chronic tuberculosis. It is under these circumstances that adhesion and thickening will prevent the injection of the gas or the compression of the lung. On the other hand, Hamman and Sloan state that many of their patients were so far advanced in disease that they were willing to risk a new method of treatment; whereas patients who were theoretically more suitable withheld their consent.

If we sum up the results which are at hand at the present time we think it may be safely stated that induced pneumothorax, if properly developed, is not dangerous; that it often results in an immediate modification of the cough and expectoration and in a diminution of the constitutional symptoms, and furthermore that unless the opposite lung is materially diseased, the putting out of commission of the lung on the side of the pneumothorax rarely causes any shortness of breath unless exercise is taken. So, too, the observations of those who have employed this method most largely indicate that it is of great value in the treatment of pulmonary hemorrhage. It also seems to be evident that when there is an advanced disease of both lungs little benefit can be expected, while on the other hand Hamman and Sloan think that it should be applied judiciously to suitable and moderately advanced patients in whom the disease tends to progress in spite of ordinary treatment. Manifestly this treatment is impossible if adhesions so fix the lung that it cannot collapse.

A number of methods have been advanced for the purpose of inducing the pneumothorax. If Bauer's method is followed it consists in giving half an hour before the operation ¼ grain of morphine. A small incision is made in the skin over an intercostal space, the patient having been put upon the operating table with the affected side up. Usually the fifth or sixth

intercostal space in the axillary area is chosen, and a cushion is placed under the patient so as to separate the ribs. The incision is carried through the fascia and muscles and the opening is made large enough to enable the operator to inspect the parietal pleura and to discover if there are many adhesions. If not, a cannula, which has not a sharp point, with an eyelet in one side, is thrust through the parietal pleura into the pleural cavity. Through this cannula, which ought to be large enough to admit a small catheter such as is used for urethral catheterization, a catheter is passed, and used as a probe to determine the density and amount of pleural adhesions. If the pleural space is fairly free, nitrogen gas previously warmed to the body temperature is allowed to slowly enter, the quantity varying from 500 to 1000 cubic centimeters, according to the size of the chest. If there are many adhesions the gas will not enter readily or may stop flowing, and under these circumstances it may be necessary to make one or two punctures.

The method pursued by Forlanini is much simpler than this. He introduces a small aspirating needle through the intercostal space and allows the gas to flow through it. Furthermore he rarely employs more than two or three hundred cubic centimeters, and gradually induces collapse of the lung by the daily injection of small amounts until a complete pneumothorax is developed. The amount of compression of the lung can be estimated not only by the method employed in ordinary physical diagnosis but by the use of the *x*-ray.

The object of using nitrogen gas is to obtain a gas which is more slowly absorbed than is atmospheric air.

The method employed by Hamman and Sloan is to some extent more complicated than that just described. They wisely pass the gas through a wash-bottle, containing 1-to-500 bichloride of mercury solution. The nitrogen gas is supplied from a tank in which it is compressed by the manufacturer. They also place a sterile piece of absorbent cotton, which is tightly packed, in the glass tube between the wash-bottle and the needle. They also use a mercurial manometer attached to the tube, since by this means it is possible to determine the pressure which is being induced in the thorax. Care must be taken before the gas is turned on that the point of the needle is not engaged in the lung. This can readily be determined by slightly moving the outer end of the needle, for if the point be free in the pleural cavity there will be no resistance, whereas if it is engaged in the lung it will not move freely. Withdrawing the needle slightly will disengage it from the lung.

Hamman and Sloan found that in their experience an injection every second or third day was adequate, and that after they had induced complete collapse an injection once a week was sufficient to maintain this condition. That repeated injections are, however, necessary is shown by the fact that the normal pleural cavity is capable of absorbing from 80 to 100 cubic centimeters of nitrogen a day, although as the treatment goes on this ability to absorb diminishes. The amount of pressure which is to be employed is just sufficient to collapse the lung and no more.

It goes without saying that the greatest possible precaution should be taken to maintain absolute asepsis, since otherwise pyopneumothorax may be engendered, which is obviously a serious complication. Still another possible danger is air embolism, but this is not as dangerous as it was at one time thought to be.

An interesting point arises as to how long the collapse of the lung should be maintained. The general opinion seems to be that it should last for a year or more, and it is a remarkable fact that not infrequently after the tuberculous process has been arrested in this manner the pressure can not only be diminished without damage, but the lung may be allowed to slowly expand, and does slowly expand and to some extent resume part of its function.

Hamman and Sloan admit that induced pneumothorax will never become a routine method for treating pulmonary tubercu-

losis, but they believe that it has a distinct sphere of usefulness in a limited class of cases.

THE LETHAL DOSE OF CORROSIVE SUBLIMATE.

Almost always when a physician is called to testify in a court of law in a case of poisoning he is asked by one of the attorneys, or by the judge, "What is the lethal or fatal dose of the poison under consideration?" and not infrequently the legal mind finds it difficult to understand why the physician cannot name a definite or fixed amount of a well-known toxic agent.

There are, of course, many reasons for this aside from the difference in susceptibility of the individual. Much depends upon the rapidity with which the absorption of the drug has taken place, and this in turn depends upon the activity of the circulation, the competency of the stomach to perform its functions, and whether the poison is diluted by considerable quantities of food and drink. For this reason all those who are acquainted with toxicological literature know that the lethal dose of death-dealing drugs must vary in each individual case, in some instances an amount scarcely larger than that sometimes employed for medicinal purposes acting as a poison, and in other instances very large doses being taken without the production of very dangerous symptoms.

An illustration of this is afforded by a report made to the *British Medical Journal* of January 18, 1913, by Fuller, who records the case of a man eighty-five years of age, who swallowed by mistake 8¾ grains of bichloride of mercury. The patient at once recognized his error and drank a tumblerful of barley water. Seen by his physician half an hour later he was given white of egg, and when he retched he brought up blue-stained mucus from the indigo in the bichloride tablet. The stomach tube was then passed and the stomach washed out with large quantities of albumen-water and milk and water. There was an urgent desire for the bowels to move, but very little more than mucus was passed. The patient became extremely collapsed, was cold and pallid, and the pulse was almost imperceptible. Strychnine was given hypodermically and milk and brandy by the mouth. The next morning he was somewhat better, but was still in a very critical condition, and for several days the bowels continued to be very irritable, but his general condition improved. We are told that after a slow convalescence he quite recovered from the effects of the poison. Fuller points out that while other cases have been recorded in which recovery has followed an even larger dose, nevertheless an instance is reported in the *British Medical Journal* for 1905, Volume I, in which a dose of 2½ grains was swallowed and death ensued in three weeks from the diarrhea which was induced. The fact that recovery took place in a man of eighty-five years is also of interest.

THE PREVENTION OF ANAPHYLACTIC SHOCK.

When we consider how many hundreds of thousands of doses of diphtheria antitoxin have been administered within the last fifteen years the instances in which grave results have accrued, by reason of anaphylaxis, are so few as to be scarcely worth consideration, were it not that in some of these cases the condition was so grave that death resulted. The occurrence of sudden death within a very few minutes after an injection has come to our attention within the last few days, has renewed our interest in this subject, and caused us to give careful consideration to a contribution made by Vaughan to the *American Journal of the Medical Sciences* for February, 1913. In the particular case to which we refer the sensitizing of the patient had not been induced by a previous injection but was dependent upon idiosyncrasy, and this idiosyncrasy was apparently part of an asthmatic tendency from which the patient suffered. Several members of his family received an immunizing dose without any ill effects whatever, but he was found dead within a very short time after the injection.

Even if such instances are exceedingly rare their gravity deserves much careful study, and we can scarcely agree with Vaughan when he says that from the practical standpoint anaphylactic shock is the least important of the phenomena of sensitization, nor can we agree with him that it is always an artificially induced condition, since it is found already existing in certain asthmatics and therefore has not, strictly speaking, been artificially induced.

The point which is of greatest interest to the practitioner is the occurrence of such an accident. It has been shown by Bedreska that intraperitoneal injection of 1/100 to 1/50 of a Cc. of the antitoxic sera produces immunity, but manifestly this method of treatment cannot be resorted to in human beings. The advice which Bedreska gives is that by preparatory heating of the serum to 56° centigrade the phenomenon can be largely diminished in violence if not wholly averted, and he recommends that all therapeutic sera be so prepared. Again, it has been shown that alcohol and ether narcosis gives a complete and transitory immunity to anaphylactic shock. They do not, however, control it after the shock has developed, and therefore alcohol and ether can only be used beforehand as preventives, and they are not likely to be employed unless it is known that the patient has been sensitized by previous injection or is possibly naturally sensitive by reason of the diathetic condition which induces asthmatic attacks. It has also been found that if a small portion of the serum be heated to 80° centigrade and injected, this produces a lasting and certain immunity to anaphylaxis, but unfortunately this immunity is very slowly developed and for this reason cannot be attempted when the immediate use of antitoxin is essential. Furthermore, it is not proper to heat all the serum to 80° centigrade since this will render the antitoxin inert.

Bedreska asserts that the best method of averting anaphylactic shock is either by the rectal injection of the unheated serum before the dose is given hypodermically, or better still, by the subcutaneous injection of a very small dose, and Vaughan, Jr., claims that a preliminary injection of as little as 0.1 or 0.2 Cc. should be made, and after an interval of two hours, provided no untoward symptoms have appeared, the full dose be given. In very susceptible persons, however, even these small preliminary or testing doses may induce grave symptoms. Even if they are efficient in preventing such a disastrous consequence as death they may not be sufficient to protect the patient from symptoms which will cause the greatest alarm to himself and to his physician. The class of cases in which antitoxin is to be considered particularly dangerous is that which is made up of asthmatics, and those who have received previous injections of the serum twelve days or more before the dose which is immediately under contemplation. So far as we know atropine in full dose hypodermically or intravenously is also an efficient aid, but not by any means a sure remedy when sharp symptoms of anaphylaxis are manifested.

To sum the matter up, we think it may be stated that in the ordinary individual not asthmatic and not sensitized by the previous use of serum, the danger is so remote that it should never delay the physician's hand a moment in the administration of this valuable remedy in the presence of diphtheria or tetanus. If the physician believes, for the reasons just given, that the patient is unduly sensitive, the subject should be etherized and should receive a hypodermic injection of atropine, and simultaneously receive hypodermically a very small testing dose, such as we have named. If in the face of these precautions disaster occurs the physician is not blameworthy because it is essential to administer the antitoxin to combat the likelihood of death from the infection, and because he has utilized all the protective measures which are known to science in an endeavor to prevent a manifestation of this unusually interesting but nevertheless dreadful result of a well-recognized therapeutic procedure.

RENAL TUBERCULOSIS.

Among the many questions of treatment incident to pathological conditions of the kidneys few have been more definitely considered than that of the best procedure to adopt in cases of renal tuberculosis. Surgeons and internists are, with few exceptions, practically agreed that given unilateral tuberculous involvement of the kidney, whether this be primary or secondary to other focus, if the patient's condition be fairly good and the function of the as yet not clinically involved kidney be satisfactory, a prompt nephrectomy offers the best sort of immediate and permanent cure. A most instructive and thorough study of this subject was presented by Legueu and Chevassu before the Seventh International Congress on Tuberculosis.

The results obtained from the surgical treatment, medical treatment, and from the use of tuberculin were carefully compared, this study having been based upon a sufficient number of cases to make the findings worthy of careful consideration. Moreover, in the final summarization only those cases so carefully reported as to be convincing are included. As to the surgical treatment, the authors have collected the statistics of 23 surgeons which show that 1539 nephrectomies practiced for the relief of renal tuberculosis were followed by an operative death in 92 instances, making a mortality of 5.9 per cent. Only 708 of these cases were so fully reported as to allow of detailed study. Of these 151 are bettered—43 as the immediate result of operation, and 108 later. Of the operative deaths 12 were due to insufficiency of the remaining kidney. None were directly attributable to the tuberculosis itself. Of the 108 consecutive deaths 91 were explained; 75 were due to tuberculosis; 28 of these of the lung; 17 of the remaining kidney; and 14 of a disseminated tuberculosis. Nearly all the consecutive deaths occurred within a year of operation. Of 557 survivors who have been carefully followed 291 are completely well, 185 have only partial restoration of health, 23 are somewhat invalided, and in 58 the cure has not been specified. The 23 partially invalided cases suffered either from pulmonary or renal tuberculosis or failed to regain strength after operation. It is probable that their lives will be short. The incomplete cures, numbering 185 cases, felt well but suffered from frequent, at times painful, micturition and turbid urine. Their condition seems associated with a persistent vesical tuberculosis. Of the 291 complete cures the urine is clear and in many instances has been shown to be free of tuberculosis by guinea-pig injections. Some few have a slight frequency of urination. In 58 cases reported as cured the data upon which this opinion is based are not sufficiently explicit to allow of full acceptance. This report is summarized by Saint-Cene, to the effect that of 708 nephrectomies there were 173 poor results (24.5 per cent) and 534 good results, or 75.5 per cent.

As to the results of medical treatment of 738 cases subjected to this without surgical intervention 456 died, or 61.9 per cent; whilst 282 are living. All the cases died of renal tuberculosis or of an intercurrent tubercular complication. Most died within two years, others in five years. A few survived for many years even up to thirty, but ultimately perished of tuberculosis. Of 40 patients who had suffered from the infection for from five to ten years, and 22 for more than ten years, only 36 exhibited distressing clinical symptoms, and of these 36 but one can be regarded as completely cured.

As to tuberculin treatment, 184 cases have been collected. The summarization of the tuberculin-treated cases shows that 18 died, 24 remained stationary, 91 were bettered, and 51 cured. The betterment was both a local and general one. Of 16 cases nephrectomized after the tuberculin treatment, four perished shortly after from generalized tuberculosis. Of the 51 cases reported as cured, in only 27 are details given which render this statement acceptable, and of these 27 in 16 the cure is of such recent date that it may represent simply a transitory betterment. Eleven

cases really seemed to be cured, a year having elapsed without symptoms of any kind.

Viewing these various results, it seems clear that by surgical treatment half the cases of renal tuberculosis may be cured and a quarter bettered. Medical treatment has proven its inefficiency, tuberculin treatment produces a betterment, but rarely cures, and perhaps has its greatest application after nephrectomy. Legueu and Chevassu consider that it may be advised when renal tuberculosis is diagnosed early before pyuria and when it occurs in young subjects. As to the general principles of surgical treatment before operation, there should be a thorough general antitubercular regimen, supplemented, if needful, by local treatment of the bladder. During this period a thorough investigation of the functional activity of each kidney should be made. In the operation the kidney should be removed without opening it, thus avoiding inoculation of the wound. Moreover, as much of the perirenal tissue as possible should be taken away; as far as practical the nephrectomy should be extracapsular. No effort should be made to remove a segment of the ureter since the fistula which occurs in about 10 per cent of cases is quite as likely to happen when this is done as when the ureter is left comparatively alone.

Total cicatrization of the cavity after the removal of the kidney requires some time. Israel observes that in 25 per cent of cases a fistula lasts for about two years. Injection of bismuth paste has materially hastened the closure of these openings. Usually the ureter scleroses. At times tuberculous infection persists and secondary operation is needful to remove a portion of it.

After removal of the kidney vesical tuberculosis usually betters and then gets well. At times, however, it persists. Operation is rarely required for its relief. When there is a persistent cystitis, however, cystostomy may be required or vesical exclusion by implantation of the functionating ureter into the large intestine. The remaining kidney undergoes compensatory hypertrophy and functionating activity. The nephritis to which it is usually subject incident to tuberculous kidney may be progressive or it may develop tuberculous infiltration. For the purpose of determining before operation the absolute health of the presumably sound kidney, a number of inoculations of urine obtained from it are advisable. Since 50 per cent of cases of renal tuberculosis are cured by operation even when the diagnosis is not made early, it is obvious that this percentage could be materially increased by an early recognition of the condition.

Rafin (*Journal D'Urologie,* tome 1, No. 6, June 15, 1912) has made a careful study of 160 case histories, these patients having been subjected to primitive nephrectomy because of renal tuberculosis with the idea of determining what symptoms first called attention to the abnormal condition of the kidney. He notes that vesical symptoms were those which first attracted the patient's attention in over 60 per cent of the cases, renal symptoms in about 20 per cent. Only 2.5 per cent exhibited early marked impairment in general health. Changes in the urine, such as albuminuria, turbidity, or hematuria, were the first to attract attention to the abnormal condition in less than 10 per cent. As to urinary changes Melchior has long since announced that the urine of patients subject to urinary tuberculosis is usually aseptic, from which follows the dictum commonly accepted that a sterile purulent urine is almost certainly tubercular. Rafin has corroborated this view, contested by Albarran; from 239 examinations he obtained positive cultures in 71 cases; usually it was staphylococcus. Of these 71 infections 37 were due to anterior catheterization and 9 to an accompanying blennorrhagia. Hence there remain but 25 cases in which the exogenous nature of a mixed infection was proven. Moreover, in probably the majority of these 25 cases an exogenous cause is not improbable. Hence it apparently remains true that an aseptic pyuria indicates tuberculosis. Incidentally it seems clear that all intravesical manipulations under such circumstances

should be avoided unless positively indicated, and should then be conducted with the utmost precaution.

THE REMOTE RESULTS OF TONSILLOTOMY AND TONSILLECTOMY.

In these modern times of wide dissemination of a crude knowledge of physiology, surgery, and medicine; with a growing appreciation of what can be accomplished by prophylactic or prompt surgery, the skilled operator has often to exert more persuasive powers upon the patients who insist upon being operated upon for conditions which do not exist than he did in the olden times upon those who absolutely required surgical intervention but refused to submit. An ordinary stomachache is usually interpreted as a sign of appendicitis, which indeed it often but not always is. The family doctor is psychologized into the belief that such a condition exists, and the surgeon is promptly called in to avert a possible perforation. The same obtains in regard to tonsils and adenoids. While it is true that the vast majority of these operations are absolutely indicated, it is none the less probable that many comparatively harmless yet unnecessary abdominal and throat traumas are practiced. In this relation Whale (*Lancet*, Feb. 15, 1913) has made what he calls an analytical scrutiny of 220 unselected cases all operated on in one clinic, 110 tonsillotomies, and 110 tonsillectomies; 70 per cent of these patients were examined at an average period of two years after operation.

It is noted that tonsillectomy is slightly more likely to cure obstructive dyspnea and much more likely to prevent recurrence than is tonsillotomy, and that for aural troubles total operation is better. For gastrointestinal troubles and remote affections such as various forms of goitre, and systemic infections, no strong inference is justified, though it is noteworthy that in some cases rheumatism occurred after enucleation in patients who had never suffered before. The following figures show that if rheumatism and chorea be classed together tonsillectomy has a slight advantage: Tonsillotomy, cured, 63 per cent; not cured, 37 per cent. Tonsillectomy, cured, 68 per cent; not cured, 32 per cent.

Certain complaints which were unknown prior to surgical intervention, and which might reasonably be traced to it, include tonsillitis (after tonsillotomy only), rhinitis, lymphadenitis, rheumatism and chorea, and laryngitis or functional voice troubles. In some cases deformities of the palate were noted. As a rule the complaints arising *de novo* after operation favor tonsillectomy in every case. To this rule voice troubles are the exception in that they are just as likely to be initiated by tonsillectomy as by tonsillotomy. It can be shown that absence of evident tonsillar remains does not determine freedom from the infection which can be diagnosed as tonsillitis, and that the presence of such remains does not render such infection much more probable.

Following tonsillar operations there is usually weakness of the singing voice, either of the middle register, where the head-notes change to chest-notes, or of the notes at the top of the compass, while the conversational or oratorical voice becomes thick, husky, hoarse, or weak. There may be intermittent aphonia, partial or complete. In so far as the cure of voice troubles is concerned, tonsillotomy seems to be the method of choice. The failure to cure, or fresh supervention of voice troubles after operation, is in some cases referable to deformities produced by the operation. The cases in which this failure or sequel occurs without any demonstrable deformity are: after tonsillotomy 27 per cent; after tonsillectomy 48 per cent. The cases cured of voice troubles by tonsillotomy, and also those cured by tonsillectomy, have been divided into those exhibiting and those not exhibiting tonsillar remains at examination. The cases not cured by one or other operation, or in which voice troubles arose only since operation, have been similarly divided. Of the cured cases, whether total or partial emptying of the tonsillar fossa was intended

by the operation, nearly one-half present considerable tonsillar remains; whereas the percentage proportion of uncured cases is nearly twice as great after tonsillectomy as after tonsillotomy. From which it is concluded that tonsillotomy is more likely to cure functional defects of voice, and less likely to leave such sequelæ.

It is further noted that lymphadenitis was not cured by tonsillotomy in 43 per cent and in tonsillectomy in 33 per cent. Lymphadenitis which had never occurred prior to operation and which was found at subsequent examination, all other positive infective foci having been excluded: tonsillotomy, 30 per cent; tonsillectomy, 20 per cent. Infection of glands from an empty tonsillar fossa occurs more frequently when the guillotine has been used in the old-fashioned way than by any other method. It seems clear that for the cure or avoidance of lymphadenitis, tonsillectomy is the operation of choice. If tonsillotomy be practiced for the cure of infection, the capsule is left behind, whether any tonsillar remains keep it company or not. And it is possible that after a very thorough tonsillotomy, leaving no microscopic remains, the capsule keeps the fossa stretched open, and more prone to absorb irritants or microörganisms. Or that after a still more thorough tonsillotomy the guillotine in certain places cuts deeply, well beyond the capsule, freely opening up the areolar tissue, which subsequently heals by the formation of granulation tissues too loose and thin to resist septic absorption. If the view be adopted that tonsillar remains tend to cause lymphadenitis, it is more important to eradicate the lower pole (with the plica triangularis) than the upper pole.

Hemorrhage occurred after tonsillotomy in one case in 110; after tonsillectomy in 8 cases in 110. These figures are further supplemented by the St. Bartholomew Hospital records, which show that in 1909, when tonsillectomy was rarely practiced, there were 12 cases of serious hemorrhage out of 984 operation cases. In 1912, when tonsillectomy was frequently practiced, there were 53 out of 1561 operated on. The figures are, in 1909, ½ per cent, as against 2.9 per cent in 1912.

The deformities found included 21 per cent of cases after tonsillotomy, and 23 per cent after tonsillectomy. Most of these deformities are harmless, but an analysis shows that such deformities causing trouble occurred after tonsillotomy in 6 per cent of cases, but after tonsillectomy in 10 per cent of cases. Thus a painful deformity is commoner after tonsillectomy.

The disadvantages of tonsillotomy are: (1) The initiation of an infection, whether manifesting itself as tonsillitis, lymphadenitis, or both. Such sequelæ are more likely if a very free and deep removal has been performed than if only a moderate amount of the tonsil has been removed. (2) Recurrence of the trouble for which the operation was performed, except in the case of voice troubles, when recurrence is no more probable than after tonsillectomy.

The disadvantages of tonsillectomy are: (1) A risk of serious or even dangerous hemorrhage at operation. (2) A risk of harmful deformity supervening later; the deformities most likely to cause harm are adhesion of the posterior faucial pillar to the posterior pharyngeal wall, and overgrowth of the plica triangularis. (3) A risk of voice troubles supervening later, even without any causative deformity. To any patient who requires operation for some other reason, who has never had any voice trouble, and whose livelihood or occupation depends on the use of the voice, tonsillectomy should be urged with caution.

Thus it would appear that tonsillectomy is the more dangerous operation. But with the single exception of voice troubles, it is more likely to permanently cure the complaint for which advice is sought, notably so in the case of tonsillitis or lymphadenitis; moreover, these two infections are never initiated by tonsillectomy. It is important to eradicate the lower pole.

REPORTS ON THERAPEUTIC PROGRESS.

A CASE OF ACUTE NEPHRITIS, WITH UREMIA, FOLLOWING SALVARSAN.

KAHLE reports a case of this character in the *New Orleans Medical and Surgical Journal* for February, 1913. The points of interest in this case which may be emphasized are:

1. The Wassermann reaction was positive, when using the Tschernogubow modification, five days after the appearance of the initial lesion. This would indicate that the Wassermann can be of great value in clearing the diagnosis in early primary lesions in which the spirochætæ cannot be found because the lesions have been subjected to treatment. It is not claimed that a positive Wassermann would be invariably obtained in every case at such an early stage, but should it be, valuable time would be gained.

2. That great care should be exercised in the administration of salvarsan, bearing in mind that injury to the kidneys may follow even in cases in which those organs are sound, whereas in cases of incipient or latent nephritis the condition may be made acute by the drug.

3. That in making examinations of urine, before or after giving salvarsan, we should not be guided solely by the presence or the absence of albumin, because there may be serious lesions of the kidneys in which the amount of albumin is no index to the severity of the lesions present. Granular and finely granular as well as hyaline casts may be present in great numbers when albumin is absent, or present only as a trace. This observation is based not only on these cases, but on many others which have been examined in connection with other complaints.

4. That although a diminished quantity of urine following the injection of salvarsan may be of no special significance, it should put us on our guard, more so if accompanied by other disturbances such as vertigo and headache. In over one hundred and seventy-five injections given in private practice and in the clinics, a diminished quantity of urine was not infrequently observed. However, no serious complications followed except in the case reported here. Let it be noted that vertigo and headache were not present in any of the other cases.

5. That a rash, erythematous or urticarial, may be produced by salvarsan as it is being eliminated by the skin.

6. That even when the kidneys have been severely damaged, all signs of trouble may disappear completely in a few days.

THE EFFECTS OF SALVARSAN UPON THE AUDITORY NERVE.

The *American Practitioner* for January, 1913, contains an article by BARDES in which he calls the attention of the profession to the danger of impairing the hearing by giving an excess of salvarsan. The hearing of forty-seven patients who received the drug, mostly intravenously, was tested. Of this number six have become hard of hearing. Before they received the treatment their hearing was normal. In four of the cases the aural disturbance was not noticed until the second injection had been given.

Arsenic, like all other powerful drugs, is highly injurious if the proper dose is exceeded. There can be no question that salvarsan is immeasurably superior to any other drug for syphilis. The knowledge that one dose is insufficient to effect a cure has led to the repeated and often indiscriminate use of the drug. Therein lies the danger.

It seems illogical to give the same dose of so dangerous a drug as arsenic to all syphilitics, without respect to age, weight, or tolerance, when we all know that certain individuals have a decided idiosyncrasy for it. The organ that is especially susceptible to its influence is the delicate and highly sensitized organ of hearing. Other drugs that have a selective action upon this organ are quinine and the salicylates. When these drugs are given in excess, the ears begin to

buzz, and frequently this buzzing remains, and is the prelude to a progressive deafness.

It is perhaps fortunate that much of the salvarsan that is thrown into the circulation when given intravenously is rapidly eliminated by the kidneys. In this way its toxic effect upon the system is lessened.

In all of Bardes's cases the onset was the same—that is, in from a week to a month after the injection head noises were perceived. In proportion as the noise grew louder the hearing became poorer. In two instances the noise is now subsiding, but alas! the deafness fails to improve.

An examination of the ears and adnexa of these patients revealed no morbid changes. Hearing tests showed diminished serial and bone conductions, especially for the high tones. The caloric tests showed dulled labyrinthine response. There are no symptoms of middle-ear or internal-ear irritation, such as pain, dizziness, vomiting, or nystagmus. The symptoms of the patients are those of a lesion affecting the auditory nerve.

Bardes suggests that the hearing be tested each time before giving salvarsan. If it is poor, or if head noises are present, the drug should be given with caution, and if the hearing is affected by the salvarsan, it should not be repeated until the ears are normal.

SYPHILITIC AORTITIS: ITS TREATMENT.

LONGCOPE deals exhaustively with this subject in the *Archives of Internal Medicine* of January 15, 1913. He asserts that since the recognition of the syphilitic origin of certain cardiovascular diseases, antisyphilitic treatment has been recommended and used with varying degrees of success. It is usually stated that such treatment may bring about relief from pain. Within the last few years, however, more particular attention has been paid to the treatment of these cases. Goldscheider thinks that the outlook is poor. Potassium iodide is insufficient and must be combined with mercury or salvarsan. Oigaard, on the other hand, reports rather satisfactory results with the use of mercury and iodide. In this manner he has treated fifteen patients, with marked improvement in all cases. This benefit showed itself by the disappearance of substernal pain, angina, and paroxysmal dyspnea, in increasing strength and returning ability to work, and an improvement in the anemia when this was present. The relationship which he found to exist between the Wassermann reaction and disappearance of symptoms is interesting. In six cases the Wassermann test became negative during the first cure, which lasted about three months; in the remaining cases the reaction disappeared more slowly, and only after two or three courses of treatment. In three instances there was a return of symptoms while the Wassermann was still negative, while in four the symptoms disappeared before the Wassermann.

With the introduction of salvarsan, Ehrlich's original warning against the use of this drug in the presence of cardiovascular disease prevented for some time its employment in syphilitic aortitis, but now sufficient data have accumulated to show that the danger under such conditions is slight. Breitmann, who collected the cases of death after salvarsan injections, reported in the literature, has discussed this question quite fully from a theoretical standpoint. He thinks the drug may prove dangerous when there is disease of the coronary arteries.

The experimental work of Auer has shown that salvarsan injected intravenously in acid solution is dangerous. Rabbits and dogs injected intravenously with 0.5-per-cent acid solutions develop cardiac dilatation, and show abrupt fall in blood-pressure with immediate death. The intravenous injection of 0.5-per-cent alkaline solution in dogs seems to have little effect on the blood-pressure, and no marked effect on the heart, though its factor of safety may be so reduced in some instances that an extra strain brings on fibrillation and death. With higher dilutions of the drug, even acid solutions may be harmless when injected slowly. The alkaline solution employed by Auer is five times as strong as that used for man, in

whom 0.1-per-cent solutions are employed. Hoke and Rihl, who experimented with intravenous injections of 0.5-per-cent salvarsan in alkaline solutions, state that such a solution will lower the blood-pressure in rabbits, but that this is principally due to its effect on the central nervous system, and not on the heart and blood-vessels directly.

From a practical standpoint the use of salvarsan in syphilitic aortitis seems to be comparatively harmless, though there is a possible source of danger when large doses are given; and the main point at issue is as to whether it is of real benefit. Weintraud has reported the results of treatment by salvarsan of twenty-six cases of syphilitic heart and arterial disease. The cases included aortic insufficiency, angina pectoris, myocardial disease with syphilitic arteritis and sclerosis of the cerebral arteries. He has not seen any ill effects from the injections. Two to four injections of 0.2 to 0.5 gramme were given. In many of the cases there were no symptoms, or where symptoms were present they were so mild that any benefit derived from the injections could not be estimated. In only three cases, all of aortic insufficiency with angina, could he be sure of improvement. Others, too, have used salvarsan in isolated instances, but give little information as to its value (Fiessinger, Goldscheider, Biermann, Hirtz and Braun, Schminke).

Salvarsan has been given to twenty of Longcope's series of cases. Among these there were 14 of aortic insufficiency, nine of which were associated with angina pectoris, or attacks of paroxysmal dyspnea, one of these latter having an aneurism as well; five cases of aortitis associated with true angina, anginal pain, or cardiac enlargement; and one case of aneurism.

The drug has been given for the most part intravenously, but in six cases it was used before the intravenous method of administration became general, and was then given by the Lesser method intramuscularly. Three of these patients received intramuscular injections of 0.6 gramme, 2 received 0.45 gramme, and one 0.5 gramme. The remaining 14 cases have usually been given several doses of 0.3 gramme intravenously. In this manner of divided dosage four cases have received 0.3 gramme each, two cases 0.6 gramme each, four cases 0.9 gramme each, one case 1.2 grammes, one case 1.8 grammes, and one case 3 grammes. The doses have been given usually at intervals of eight to ten days. Salvarsan reactions have not been very common. Severe reactions with chills, fever, and vomiting or diarrhea have occurred only six times in the thirty-seven administrations. During the last year freshly distilled water has always been employed.

In choosing the dosage Longcope preferred to administer small amounts repeatedly, rather than one or two full doses; and after his rather limited experience this attitude seems justifiable, for it is possible that there is some danger in giving large doses, particularly in patients with angina pectoris and paroxysmal dyspnea.

CONDITIONS DURING PREGNANCY WHICH JUSTIFY ABORTION.

HUMPSTONE writing in the *Long Island Medical Journal* for January, 1913, tells us the indications for therapeutic abortion are undergoing a revision these days in the light of the advances of the pathology of pregnancy. Alas, in the morally weak minds of many of the profession this revision has come to include sociologic and economic indications which are contrary to the laws of nature and the state, and contrary to the best interests of the home, the nation, and civilization!

Therapeutic abortion is the induction of abortion by a physician to save the life of the mother, and is only to be accomplished after consultation has carefully considered the dangers and determined its necessity. Conservative as we should be in meeting this problem, it is not to be forgotten that we may be too conservative, and wait too long, until abortion will not save our patient, and this applies particularly to pathological conditions which are directly due to pregnancy.

These are some of the more serious mani-

festations of the toxemia of pregnancy, the exact cause of which we do not know but now fully believe to be either some toxin obtained from the fetal or placental metabolism, or else some disturbance of the maternal metabolism, most probably in the ductless glands, which makes the maternal excretion of the normal fetal products of metabolism impossible. This toxin has a most marked effect on the liver, on the entire nervous system, the kidneys, the heart, and the blood-vessels—these pathological effects being manifest clinically by persistent vomiting, continued high blood-pressure, loss of flesh, muscular weakness, various psychoses, diminished urine with its disturbed protein excretion. Any one of these symptoms may demand abortion.

Persistent vomiting, when associated with a pulse rising to 100 or over and a little fever, and rapid loss of flesh, is an absolute indication for abortion, and it is to be remembered that it is very easy to make the mistake of carrying these patients too far before relieving them. If the vomiting does not cease after ten days of suitable treatment and the pulse is 100 or over, no time is to be lost. These cases are to be carefully differentiated from the malingering hysterical cases of vomiting.

Continued high blood-pressure, over 150, if associated with dyspnea and renal insufficiency and not responding in a few days to suitable treatment, is another absolute indication.

Muscular weakness increasing with the associated pains of a developing multiple neuritis, especially if there is present any psychosis, is an absolute indication; on the other hand, any increasing psychosis, even though there be absent any signs of the involvement of peripheral nerves, is an indication.

Last of these toxic cases is the rare type of nerve affection, chorea gravidarum, which is an absolute indication.

Besides the toxic causes, we have two other causes directly attributable to the pregnancy itself which demand immediate abortion—the one, an incarcerated retrodisplaced pregnant uterus, caught beneath the sacrum, which cannot be reduced under anesthesia; the other, an acute hydramnios in the early months of pregnancy, with its associated cardiac insufficiency.

The second class of cases demanding immediate abortion are those in which exists some disease which would be aggravated to the point of endangering life if pregnancy continued, and in which we may hope to considerably prolong life by ending pregnancy. We include in this class heart disease, kidney disease, tuberculosis.

Heart disease complicating pregnancy always presents a problem demanding the closest of observation and the keenest of judgment. Views on this question vary, from abortion of every case of heart disease to the opposite opinion that abortion is never indicated in heart disease. In dealing with this question we have always to consider not only whether it is possible to carry pregnancy to viability, but also how much invalidism and shortening of life will be caused by allowing this pregnancy to continue. It is undoubtedly a fact that life will be more or less shortened by pregnancy occurring in a patient suffering from endocarditis. The patient and her husband are entitled to an opinion in this matter. Two valvular lesions are, in Humpstone's opinion, absolutely indicative of abortion—the one, aortic stenosis; the other, mitral stenosis with or without insufficiency.

In cases with simple insufficiency of the valves, the most favorable are mitral insufficiency, when compensative hypertrophy is sufficient. These cases regularly do well. The important point to remember is, has this heart compensation been broken without pregnancy, and how many times, and how badly? If the compensation has been sufficient for ordinary health, pregnancy may be tried with the understanding that should a break in compensation occur which is not easily controlled by proper medication and rest, the immediate termination of the pregnancy is indicated.

In chronic diffuse nephritis, with exudation of finely and coarsely granular casts, where chronic uremic symptoms have persisted, it is out of the question to expect

such damaged kidneys to be sufficient for pregnancy. The same holds true for the chronic diffuse nephritis without exudation, with its associated arterial thickening, blood-pressure, and weakened heart muscle.

These cases are to be sharply differentiated from cases which have had one or more attacks of acute nephritis with or without pregnancy; such cases demand the most careful of observations, but are not in themselves necessarily indicative of abortion.

Tuberculosis is very unfavorably influenced by pregnancy. In Humpstone's opinion, in any case in which active pulmonary tuberculosis is manifest early in pregnancy, abortion should be performed. In the so-called arrested cases without systemic symptoms it is, he believes, justifiable to allow pregnancy to continue unless there are evidences of the disease lighting up. In the advanced cases of tuberculosis it is well to remember that the emptying of the uterus is likely to be followed by a very rapid fatal termination of the malady.

The last condition for which therapeutic abortion is indicated is not an absolute one. He refers to a pelvis so contracted as to be an absolute indication for delivery by the abdominal route. He does not believe we are justified in saying to all such women that they must go to term and have a Cæsarian. Such a patient still has the right to choose between abortion and Cæsarian at term, but it is our duty to influence her, everything else being equal, to carry her child.

THE VARIETIES OF TUBERCULIN IN THE TREATMENT OF TUBERCULOSIS.

RAW in the *British Medical Journal* of February 1, 1913, has this to say as to the treatment by tuberculin:

It is in the avirulent bacillary infections that tuberculin is of great service, and he has found it of little or no value in acute virulent infections.

The whole object of treatment by tuberculin is to produce an immunity in the blood against infection by tubercle bacilli; and, what is even more important, to prevent the further spread of the bacillary infection in the tissues. Whether or not it is possible to ever produce a complete lifelong immunity against tubercle is a matter of doubt.

As a result of his experience Raw has found that the lesions in the body which are caused by the typus humanus are benefited more quickly and certainly if a tuberculin prepared from the opposite strain—namely, bovine tuberculin—is used; and in all cases of pulmonary tuberculosis he now only uses bovine tuberculin. It is less toxic, and does not so readily cause reaction, is more easily tolerated, and causes the bacilli to disappear from the sputum more quickly. For the lesions caused by the typus bovinus—namely, lymph glands, tuberculous peritonitis, lupus, tuberculin disease of the bladder, bones, and joints—he invariably uses Koch's old tuberculin prepared from human cultures.

The question of dosage is of vital importance, and his routine practice is to administer a course of tuberculin in twelve weekly injections, then resting for a month, and, if necessary, repeating the maximum injection every week. His dosage is as follows of either human or bovine tuberculin:

0.0001 mg.	0.0006 mg.	0.006 mg.
0.0002 mg.	0.0008 mg.	0.0075 mg.
0 0004 mg.	0.001 mg.	0.008 mg.
0.0005 mg.	0.004 mg.	0.01 mg.

A special watch must be kept on the temperature, pulse, and blood.

It is rare to observe a general reaction if the above dosage is carefully followed.

In a great many cases the tubercle bacilli disappear entirely from the sputum at the end of a course of injections, but, unfortunately, if the tuberculin is not persisted in they in many instances speedily return—so that in some cases of pulmonary tuberculosis the injections should be continued for an indefinite time.

Whilst tuberculin *per se* cannot be expected to heal cavities in the lung or replace damaged tissues, yet it undoubtedly has the power of preventing the spread of the

tubercle to healthy parts by means of its immunizing effects. Time is thus given for repair of the affected tissues.

In conclusion, Raw expresses the opinion, after treating over 600 patients with injections of tuberculin, that it is a remedy of the greatest value, especially in early cases and where the deposit of tubercle is localized, as in one apex or in a lymph gland or single joint; but where the tuberculosis is disseminated and complicated by secondary infection the use of tuberculin cannot be expected to be of much avail. It ought, however, to be tried in every case with the hope of some relief or possible benefit, as we cannot allow the patient to suffer and die without making every effort to arrest the progress of the disease.

Tuberculin is not going to revolutionize the treatment of tuberculosis. It is a valuable aid to the other methods of treatment, hence it must be used with care and discrimination and with a full knowledge of its dosage and therapeutic effects.

Raw concludes by saying that the best treatment we can offer to-day to a person infected with tuberculosis is a prolonged open-air life, preferably in a well-conducted sanatorium, excess of nutritious food, gentle exercise followed by plenty of rest, and a course of tuberculin by a careful physician.

THE DOSAGE OF DIPHTHERIA AND TETANUS ANTITOXIN AS DETERMINED BY ANIMAL EXPERIMENTATION.

PARK states in the *American Journal of Obstetrics* for January, 1913, that in Boston they are in the habit of giving large doses of diphtheria antitoxin, while in Philadelphia they give about one-half the amount given in Boston, and abroad they give about one-tenth. It seemed to him that if animal experimentation were resorted to they might derive some help. Therefore at his laboratory Biggs has made a series of experiments. It should be remembered that the toxins are elaborated in the tissues involved, and that a certain quantity is used up in attacking the cells and a certain quantity gets into the lymph and blood. A smaller quantity goes through the capillaries. This liquid in passing through in the body fluids poisons the general cells which are almost beyond reach. The question arises, how much poison is there? They tested the blood of patients coming to the hospital before they were injected. It is safe to say that no patient had more than ten times the amount of toxin, or enough to kill ten guinea-pigs. How did the antitoxin gain access to the toxin? It must pass through the tissues, through the lymph, through the capillaries.

What Park refers to is the determination of the dose by clinical observation, the location and amount of toxin in a case of diphtheria, and the amount of antitoxin required to neutralize the total possible toxin. How was this contact obtained? Access must be in the blood-tissue fluids. Charts were presented which showed the comparative amount of antitoxin in the blood at one, six, and twenty-four hours, when 10,000 units were given subcutaneously and intravenously. The time element was a very important factor, and two charts he showed were very interesting in bringing out the point that the subcutaneous injection is a very slow method of getting the antitoxin into the blood and general tissues. The antitoxin should be administered intravenously. One should not start out with the idea that in these cases two, three, or four doses of antitoxin are necessary; a single dose should be all that is necessary. The subcutaneous method should be sufficient in the mild and moderate cases, giving from 5000 to 10,000 units. The intravenous injection of 10,000 units should be employed in the advanced and malignant cases. When small amounts of antitoxin are given the patients would be saved if it was given early in the disease. If given late the chances are that the patient could not be saved by these small doses. In the very severe cases one must give large doses of the antitoxin intravenously for the purpose of hurrying it into the tissues. There

should be no delay, for this time element is a very important factor, not only in diphtheria but in tetanus. In tetanus the antitoxin should always be given intravenously, cutting down upon the vein for this work. Large doses should be given, such as 20,000 units, and repeated if necessary.

INCONTINENCE OF URINE IN CHILDREN.

The *Edinburgh Medical Journal* for January, 1913, contains an article on this ever-important topic. As to the general treatment of simple incontinence he says children suffering from incontinence are frequently high-strung, and often not in a very good general state of health; it is therefore wise, if possible, to vary the surroundings of the patient. A change of air and scene is very beneficial in many cases. It is also noticed that the incontinence is usually specially evident during the first two or three hours of sleep; it is accordingly necessary to see that the child passes water immediately before going to bed. Two hours afterward the child should be roused from sleep and the bladder again evacuated. This is especially important where the urine is alkaline. It is also important to try and establish as far as possible regular habits of urination throughout the day, and the child should be encouraged to retain the urine as long as possible, even at the risk of some slight discomfort. The amount of fluid taken should not be restricted during the day, but the last meal and fluid should be taken at least one hour before going to bed. Tea and coffee should never be given. A common treatment is to tilt up at the foot the bed of the patient, or to place something on the child's back to make lying on the side inevitable, with the idea of keeping the urine away from the most sensitive part of the bladder. Personally, Simpson has never been able to convince himself that this procedure is of the slightest use. Lastly, plenty of fresh air and a fair amount of exercise will prove important elements in effecting a cure.

With this general treatment should proceed contemporaneously drug treatment. This must usually be of a rather prolonged nature, averaging from three to six months of systematic attention. Unfortunately incontinence in children has generally become more or less a habit before it is regarded in any serious way, and considerable time under new conditions must therefore be allowed so as to break this acquired tendency; besides, while drug treatment in some cases is successful in a short time, relapses are likely, or at least liable, to recur unless the treatment be sustained and regular. Thursfield, in an article in the *British Medical Journal,* some time ago expressed his belief in the efficacy of three drugs for the treatment of incontinence—belladonna, citrate of potash, and urotropin—and his own experience certainly coincides very largely with this. In order to use these drugs intelligently, however, one must first of all carefully examine the urine, as its composition determines the particular drug to be chosen. For the purposes of treatment the composition of the urine may be divided into the following groups:

1. In some cases the urine presents no abnormal features. This "normal" condition is often seen in a case of incontinence following some debilitating illness which has reduced the strength of the patient.

2. The urine is found extremely acid, loaded with urates, of high specific gravity, and often diminished in quantity.

3. The urine is found to be neutral or alkaline, usually of low specific gravity, often containing triple phosphates, sometimes also a few pus cells with a trace of albumin, frequently much increased in quantity.

4. Urine may contain bacilli.

In the first group (normal urine cases) the treatment consists in giving a tonic to try and improve the general condition of the child. When this has been improved the administration of belladonna should be begun. In giving belladonna Simpson usually begins with 10 minims of the tincture two or three times a day, and gradually increases the doses up to 20 or 25 minims. He has never given larger doses of bella-

donna, but has used approximately larger doses of atropine. Even with the smaller doses of belladonna the child may complain of difficulty in seeing, dry mouth, etc., and when such is the case one must proceed carefully before increasing the dose. He has, however, never had very much trouble in using belladonna, but once or twice with atropine he has seen well-marked symptoms of poisoning. With the great majority of patients one does not need to prescribe beyond 15 minims thrice daily, but it is advisable to continue this for a considerable period.

In the second group (urine extremely acid, etc.) one must first reduce the acidity of the urine, and this is most easily accomplished by the use of citrate of potash in doses of 10 grains thrice daily; even larger doses may be required. When the acidity has been reduced, the belladonna should be begun. If the child's general health is not very good, 2 or 3 minims of liquor strychninæ added to the prescription is often beneficial. It is inadvisable to give meat when the child is suffering from this "acid" condition.

In the third group (alkaline urine, etc.) of cases dieting is of the first importance, all carbohydrate food as far as possible being prohibited. If the urine is very alkaline, acid sodium phosphate may be given; when the alkalinity of the urine has been reduced belladonna should be used in the manner stated above.

In the fourth group (bacilli in urine) a pure culture of B. coli is frequently obtained. If the urine is very acid it is wise at first to reduce the acidity by giving citrate of potash; then urotropin in 5- to 10-grain doses thrice daily often proves of immediate benefit. If there is mixed infection salol is often more efficacious. Mixed infection cases are often very troublesome, however, and a vaccine may sometimes be used with great advantage.

In the treatment of enuresis Simpson has tried a large number of other drugs, such as ergot, antipyrin, suprarenal extract, thyroid, etc., but he has rarely seen any good results follow after belladonna has been used unsuccessfully. Ergot, however, ought to be tried if belladonna fails. He has used thyroid frequently, but the results obtained have been disappointing. It ought, however, always to be tried in those cases in which the child is markedly backward mentally. He has never felt warranted in using the huge doses sometimes recommended (15 grains in the day), his maximum dose being 5 grains daily.

If the child is highly nervous and suffers from disturbed sleep, night terrors, etc., the addition of 5 to 10 grains potassium bromide given with the last dose at night of belladonna often does good.

It is claimed by some observers that hypnotism, suggestion, hydrotherapy, epidural injections, and lumbar puncture have all been found beneficial in certain cases. The last two, especially, of these suggested remedies appear to be too drastic treatment for such a comparatively simple condition as enuresis, and should certainly only be resorted to in very extreme cases.

THE USE AND ABUSE OF ATROPINE IN EYE WORK.

HARMAN in the *West London Medical Journal* for January, 1913, writes on this topic. It is to the main usage of atropine, the field in which it has no competitor, that he gives his attention. In acute iritis the use of atropine is of first importance. No matter what the general cause of the iritis may be, and what general treatment may be considered necessary or even urgent, the eye wants atropine, and the use or effective use of the atropine must come before all else. We must, if possible, get the pupil open widely; that checks the iritis, prevents adhesion, and saves the vision for the future. But its use must be effectual; to use it ineffectually is not to use it but to abuse it.

A very powerful mode of administering atropine is to place a small crystal of the sulphate directly on the conjunctiva and allow it to be dissolved by the tears. That method he does not like; the risks of toxic effects are too grave. The most powerful effect can be obtained by a combination of

atropine and cocaine. Each will supplement the work of the other, as has been previously explained. A 2-per-cent solution of each in water, castor oil, or in an ointment of lanolin or vaselin gives perfect results.

Harman prefers the oil and the ointment—the oil for his own use, the ointment for home use. The oil spreads immediately and acts quickly, and leaves the eye clean for examination. The ointment is best for home use, for the attendant can see what becomes of the piece of ointment: it is either placed between the lids or it is not. With the watery solution an unskilful attendant more often than not drops the solution on to the cheek. Again, there is less risk of toxic symptoms and skin irritation with the oily and ointment preparations, for less is used, and but little gets into the nose.

In a case of acute iritis such a preparation should be used every two hours for the first twelve hours, and the atropine should be put in, for the first time at any rate, by the surgeon himself. If the pupil can be dilated it will dilate under such treatment, combined with leeching, fomenting, purging, or such general measures as the case may indicate. To use weak solutions of atropine, ¼ or ½ per cent, is utterly futile. It is not using atropine, it is abusing it, for it is a pretense at its use.

Again, to continue the use of an efficient atropine preparation day after day when the pupil will not dilate because of firm old synechiæ is to abuse the drug; for the ineffectual tugging of the muscles at the tough adhesions only irritates the eye.

Excluding these points, a mistaken use of atropine is most often due to a mistake in diagnosis. This is no place to enter into a differential diagnosis of conjunctivitis, iritis, and glaucoma. But the best guard against such an error is always to watch the pupil. In an acutely inflamed eye a small pupil may mean iritis, but if it promptly dilates large and round it is surely not iritis, but probably only conjunctivitis. If the pupil dilates, but with pointed irregularities, there is, or has been, iritis. If the pupil is large, more or less oval or sluggish, it is most probably glaucoma. We should examine the pupil at each time a case is seen and look at it in a good light and through the best magnifying glass we possess. These things have to be looked for; they are not manifest to casual glances.

In chronic iritis atropine is less useful; sometimes it is injurious. In most of these cases the coexisting cyclitis is the more serious condition, and whilst the atropine dilates or benefits the iris, it relaxes the ciliary muscles and allows of an added engorgement of the ciliary body. If there be evidence of severe cyclitis in the presence of vitreous opacities atropine had better be discarded and only a temporary mydriatic be used on occasions to insure that the iritis is not becoming adherent.

With few exceptions atropine ointment is the most comforting of applications for all sorts of corneal ulcers or injuries. The fatty base is comforting; the drug quiets the reflex irritation set up from the cornea. There are some cases, however, in which a sudden change from atropine to eserine works miracles.

Chronic relapsing phlyctenular ulcers, old and sluggish ulcers with much vascular penetration, do not always do well with atropine, but they may clear up with surprising quickness when the stimulus of eserine is applied. It is nearly as effective as the operative destruction of the invading vessels by peritomy or the cautery.

The use of atropine after wounds of the cornea, accidental or operative, is always a puzzle to the beginner. What shall he use, atropine or eserine? Which will best keep the iris from prolapse?

Harman's answer is, when in doubt in these cases use atropine, and his reason is this: when the anterior chamber is open the aqueous flows directly through the opening instead of by the usual outlet, and it escapes in spurts as the pressure of the aqueous is able to force open the wound. However effectively eserine may contract the pupil it will not prevent the iris being rushed into the wound on such a sudden escape of aqueous—in fact, the collection

of aqueous behind the contracted pupil helps to cause this prolapse. The iris is most secure when it is folded right back into the corneal angle. This applies both to injuries and to cataract extraction, where iridectomy is not done. From his experience of Liebreich's extraction without iridectomy, Harman is convinced that some of the risk of prolapse ascribed to this measure is due to the incorrect use of eserine. Use atropine, and this risk is sensibly reduced.

In conclusion he refers to those few patients who are intolerant of atropine. In these the most careful usage may set up a smart, hot, dry "eczema" of the lids. When there is an acute iritis this state of affairs is most unfortunate. It may sometimes be avoided by thickly greasing the lids and skin with vaselin and dropping the smallest drop of a watery solution of atropine on the conjunctiva and sopping up with wool any tear that shows itself. Even that may not succeed, and one must fall back upon hyoscine or duboisine; homatropine does not last sufficiently long for such a purpose.

Then there are children who have suffered from phlyctenular keratitis or chronic blepharitis, and in whom we wish to attempt a correction of the refraction. In these the use of atropine will often restart all the old inflammatory symptoms, so that here homatropine should be used in one application and the examination be made and concluded as soon as the eyes are ready.

THE TREATMENT OF DYSENTERY CASES IN STATE INSTITUTIONS.

In the *Journal of the American Medical Association* of January 4, 1913, JONES says that usually when the patients present themselves for treatment it will be found that they have had a diarrhea for two or three days of which they said nothing, or thought little about, until they noticed some blood or "jelly-like stuff" in the stools. This is usually accompanied by sharp, griping pains and tenesmus. When this history is obtained the patient should be isolated if possible and put to bed. The treatment is then begun by giving 1 grain of calomel at once; Jones prefers the tablets flavored with wintergreen, for they prevent in a measure the feeling of nausea that sometimes arises from the administration of the plain calomel.

After two hours the patient is given a teaspoonful of the following prescription, which for ward use Jones has designated as "acid diarrhea mixture":

℞ Acidi sulphurici dilut., 12 Cc., or f℥iij;
Tincturæ cardamomi comp., 30 Cc., or f℥j;
Aquæ, q. s. 250 Cc., or f℥viij.

M. Sig.: One teaspoonful every two hours during the disease.

In conjunction with this the patient is to be given one tablespoonful of olive oil every two hours, and no other drugs or food should be given. Plenty of boiled water is given at frequent intervals. Exceptions may be made to the above treatment in the aged, debilitated, or those affected with arteriosclerosis, by giving, in addition, a teaspoonful of brandy every three hours.

At a State prison, where the inmates are of more sturdy physique than those found in the almshouse, this treatment has proved very efficient. In the majority of cases the discharges have stopped in from two to three days. This has also been the case at the State workhouse and the State reform school. This plan of treatment has shortened the period of bed rest from weeks to a few days. The patient has been eager and ready for food, his convalescing has not been prolonged, and the slumbering appetite for "dope" has not been aroused by the opium derivatives, or the alcoholic appetite whetted by the "hot drop" or other stimulative treatment.

In previous epidemics many of his patients have complained of postdysenteric cramps and soreness over the lower portion of the abdomen, caused, no doubt, by masses of undigested milk curds, or other irritating food material taken when the vitality of the digestive tract was at its lowest ebb. This has not been a source of trouble so far this season, and the complete rest and collapse of the intestinal tube appear to be the proper way of treating this

"institutional disease." This form of treatment has given gratifying results and should be of service to those who deal with patients in military barracks, camps, and State institutions.

TUBERCULOSIS.

Sir Clifford Allbutt, in the *Practitioner* for January, 1913, in opening a lengthy and valuable symposium on this subject and discussing the various papers presented, says the reader will look eagerly for some lead as to early diagnosis by tuberculin, but not altogether with reward. If he collects opinions from many writers in this series, he will find a rather discordant note; some of the authors are emphatically in favor of its use, others are more cautious, or more timid. At Midhurst the cases on admission are only too obvious, and no tuberculin test is necessary. Dr. Wilkinson's advocacy of this test in early diagnosis is well known, and is here enjoined again. Sir R. Powell is disposed to let sleeping dogs lie, and he reminds us of the large number of normal persons—relatively normal—who, notwithstanding, give a reaction. Dr. Latham also speaks with reserve. Mr. Jones thinks tuberculin the final judge of appeal; but he is guided not by a general but by a local reaction, which the surgeon, luckily for himself, can observe directly.

On one point there is a curious difference of opinion, namely, that while most physicians seem agreed that the use of tuberculin in diagnosis is followed by an exacerbation, or at least an awakening, of the focus, Dr. Wilkinson denies this, and asserts that, on the contrary, it has a sedative effect upon it. Those who think there is a local awakening generally comfort us by the assurance that this reawakening does no harm. It may do no harm in a focus already not inactive; it may even modify it in some favorable way; but what about some other focus, dormant or unsuspected, on the way to obsolescence? The general practitioner will desire some more solid assurances than are provided in these papers before he will trust himself, for diagnostic purposes, to arouse reactions which might be injurious. There is too much at stake; and even for the expert the number of "normals" (or persons practically normal) who react is embarrassing.

To turn now to medical treatment; and, first of all, to the curvature applications of tuberculin, as the subject on which the practitioner will be most desirous of light. Allbutt thinks it will be found that although some writers are less sanguine than others, yet all of them admit that this agent cannot be left out of the reckoning. Sir R. Powell is cautious in his estimate of its use. Dr. Priestley tells us to beware lest we be carried away too far on a wave of optimism concerning it; he is, nevertheless, advancing toward the more intensive mode of administration. The divergence of opinion between such experienced writers, between those who press for the intense method and those who prefer the more gradual, or "reactionless," method, shows that we are not as yet in possession of adequate data nor of mature opinion. We do not derive from all the writers who deal with this subject an equal assistance. Mr. Allan Bennett, of the Torquay Tubercle Dispensary, gives us an exact description of his methods. He had tried the bolder methods, but found them harmful, especially in patients who had still to follow their occupations; so that, of late, he has been driven back on the "reactionless" methods, and is convinced that thus he is getting better results. Dr. Camac Wilkinson's article, as we should expect, advocates a very different conviction. It is highly polemical, and so far rather fails in conviction. It does not conciliate the reader to find the "Johns-Hopkins methods" called off-hand "timid and superficial." They may be so, of course; but in any case so serious an assertion should be confirmed by something more than a gibe. Our difficulty is the greater as Dr. Wilkinson on his part does not give us any instruction in what the reader especially desires, namely, in the precise details of his own practice; we receive instead some rather familiar precepts of a clinical kind.

Indeed, the author seems to warn the ordinary doctor off his ground, telling us that his method cannot be learned even in three months, and that few men—not his own pupils—are fit to be trutsed with it. At the same time, Dr. Wilkinson must be thanked for his support in pressing home the impropriety of appointing medical officers of health, as such, to posts for which experts in tuberculosis are required, and are essential to success.

It is true that the bolder, more intensive methods of treatment by tuberculin find other weighty advocates in this company; Dr. Priestley is increasing his doses and shortening his intervals. However, the prevalent opinion seems to incline to the contrary. Dr. Pritchard prefers the "reactionless" method for chronic cases, though he suggests that for some of them larger doses at shorter intervals may be better. Dr. Walters warns against the use of tuberculin in "ambulant cases," a warning which may limit the practice of the dispensaries. Moreover, during this treatment the patient is going about to infect other people. Mr. Jones, while admitting that slow, small dosage often fails, yet fears that larger doses may stir up a storm. He admits, however, that, not finding the need of the agent in his practice, his experience of it is not considerable. Dr. Latham thinks that cures under tuberculin, if continued for twelve months at least, are more permanent. Dr. Horder draws a contrast between the prophylactic and the anaphylactic principles in the vaccine, and foresees an elimination of the adverse principle. Allbutt turns from his pages for a moment to remark that Dr. Winterbotham, late resident house physician at Victoria Park, in his thesis for the M.B. degree at Cambridge in 1912, reported a division of his cases into three classes: those patients who had been treated by ordinary methods, those by creosote inhalations, and those by tuberculin; the results in the three classes were approximately the same.

At Midhurst, the staff have about 60 per cent of the cases under tuberculin. Febrile cases receive it only when bed fails to reduce the fever—*i.e.*, as a last resource. The aim is to reach the largest dose possible for the individual, and if possible to attain 1 Cc. in four months. But only about one per cent can tolerate this quantity before discharge. The method is not quite reactionless, as some signs are regularly looked for, and focal reactions, symptoms, and signs are quite common; the same dose is then repeated. Dr. Raw advocates treatment by tuberculin in scrofula, in opposition to surgical interference. Allbutt asserts he may be prejudiced in favor of the operative method introduced by Mr. Teale and himself; but he believes he has an open mind, for of late years, in not a few cases, he has tried tuberculin instead, but not with the same success. This method is far more tedious than the operation, is less efficacious, in cases of rupture is more apt to scar, and may leave a dormant focus, or more than one, in the neck.

SOME FURTHER POINTS IN THE TREATMENT OF EPILEPSY BY CHLORETONE.

BENTLEY in the *Australasian Medical Gazette* of December 14, 1912, says it will facilitate our conception of the therapeutic action of chloretone if we divide the symptoms which it produces into three stages. This subdivision is only an arbitrary one, and in practice the stages merge imperceptibly one into the other. Still the symptoms appear in the same order with such constancy that the subdivisions are warrantable. They are: (1) Dulness and drowsiness; (2) vertigo, with or without albuminuria; (3) stupor.

1. *Dulness and Drowsiness.*—In the treatment of epilepsy by chloretone, we must expect some slight degree of dulness and drowsiness, but if chloretone is continued in the doses which Bentley will presently mention, this usually soon passes off as the patient becomes more accustomed to the drug. Occasionally this does not happen, but instead cumulative action results, and the second stage is reached. It is unusual for this latter result to manifest itself

with smaller doses than 10 grains daily, and he is speaking of female patients, who are not so bulky as men. This first stage may be accompanied by a complaint of neuralgic pains in the head or face. He does not place much reliance on this, as it is a subjective symptom, and as the patients are mentally afflicted their statements are not to be depended on.

2. *Vertigo.*—The second stage is that of vertigo. At first the patient complains of dizziness, with perhaps weakness of the legs, and if chloretone is continued in the same doses, he may actually fall down from giddiness. This symptom of vertigo is of the utmost importance in the continuous administration of chloretone for epilepsy, and Bentley has little doubt that it holds good, no matter for what purpose the drug is prescribed. It is the danger-signal which we may reach, but if we pass it the result will be somewhat alarming symptoms of stupor in a varying degree. When he gave the drug in larger doses he frequently found patients suffered from dizziness, but at that time he had not fully appreciated the significance and importance of this symptom. He has previously pointed out that the vertigo of epilepsy may be mistaken for vertigo produced by chloretone. If due to epilepsy it is sudden in onset and of transitory duration. If it is caused by chloretone it is most marked about two hours after taking a dose, and the effects last for several hours.

3. *Stupor.*—The third stage, namely, that of stupor, is illustrated by a case of tetanus published by Hobbs and Sheaf in the *British Medical Journal* last year. The tetanus was of a severe type, and within five days 420 grains of chloretone was given. On the sixth day the throat was filled with mucus, which improved on the exhibition of atropine hypodermically. On the evening of that day the patient passed into a semicomatose condition, from which he eventually made a good recovery. There is no mention of vertigo by these authors, but possibly the patient was too ill to express his feelings. Bentley has placed these symptoms before us, not with any idea of deterring us from using chloretone, quite the reverse, but that we may have a due appreciation of the symptoms to expect and be on the lookout for them should they appear.

A large number of our most useful drugs produce toxic symptoms. Have we not read of deaths from injections of mercury and salvarsan? And yet these are our sheet-anchors in the treatment of syphilis. Every one of us has at some time seen toxic effects from the administration of quinine and the salicylates, yet if we come across a case of malaria or rheumatic fever, there is not one of us who would think of withholding these appropriate remedies.

The author says he need not swell this list, as it is only too well known to us all, but he adds chloretone, so that should unpleasant symptoms arise, we will not be taken unawares.

What dose of chloretone should we prescribe, and when should it be administered? Although routine is not good treatment, Bentley advises that we begin with a dose of either 3 grains or 5 grains daily, and continue this amount for a month, keeping a careful written account of the number of fits. If at the end of this time there is no improvement and no vertigo, the amount may be increased to 10 grains daily, which may be given in one or two doses. He does not recommend bigger doses than this unless the patient be under supervision, and in any case it is well to warn the patient or his relatives in regard to dizziness. It will be observed that chloretone was given in doses of 10 grains every second day; in two of the cases he showed the result was highly satisfactory. If the patient is in an institution we can begin with a daily dose of 10 grains, and if vertigo supervenes the quantity can be reduced. By this latter method the effect is more rapid than if we give smaller doses from the first. If the patient is in status epilepticus, or having serial attacks, we can give a single dose of from 30 to 60 grains, and the result is highly gratifying, as chloretone—if we except chloroform—is by far the most powerful anticonvulsant we possess. The time of

onset of fits must be the guide to the time of administration of the dose, but if the fits are equally frequent during the day and night, he has a decided preference for giving the dose before bedtime. A point of practical importance is to prescribe it in capsules, as it is such a volatile substance that it rapidly disappears, especially in hot weather, if made up in ordinary powder papers. As it is put up in 3-grain and 5-grain capsules, this difficulty is easily overcome.

Comparisons of Bromide and Chloretone Treatment.—In a previous paper Bentley gave a comparative table, and in almost all cases chloretone had a more powerful restraining influence on the seizures. Two of the cases which he showed had, presumably, long courses of bromide treatment before admission, and one of these has had no seizures for over a year. The other case is markedly improved, and the fits have almost completely disappeared. There is one point which he mentions with diffidence, and it is this, that he finds a better result from chloretone if he allows a period of, say, a month's interval between the stopping of bromide and the commencement of chloretone.

THE PERIPHERAL ACTION OF CERTAIN DRUGS WITH SPECIAL REFERENCE TO THE LUNGS.

JACKSON in the *Journal of Pharmacology and Experimental Therapeutics* for March, 1913, reaches these conclusions:

1. A new method for the study of volume changes in one lung is described. This consists in placing a specially designed metal plate between the lung and the pericardium in such a manner that the whole lung may be left freely movable in a cavity formed by the metal plate on the mesial and diaphragmatic sides and by the chest wall on the outer side. This cavity serves as a plethysmograph for the lung.

2. A method for maintaining the blood-pressure of an animal at a constant level after its blood has been rendered incoagulable by hirudin is described. This procedure makes it possible to study the action of various substances upon the lungs *in situ* when the confusing influence of enormous changes in blood-pressure has been eliminated. This method may also be used under certain conditions for the study of volume changes in such organs as the kidney, spleen, intestinal loop, hind limb, etc., when the organ, while maintaining its natural relations, is enclosed in an oncometer. For the study of reactions in the organs themselves the entering nerves may be sectioned or painted with cocaine or phenol.

3. Under these conditions adrenalin produces a prompt dilatation of the bronchioles if these had been in a state of contraction when the drug was injected. Hence the bronchodilator action of adrenalin is wholly independent of the marked rise in blood-pressure which occurs when the drug is injected under ordinary conditions.

4. Moderate quantities of atropine do not paralyze the bronchodilator nerve endings, but large doses (particularly if vanadium has been administered) seem to depress the endings to an appreciable extent.

5. The injection of a small dose of pilocarpine into a *fresh* spinal dog whose vago-sympathetic nerves have been sectioned low down in the neck generally produces a slight initial bronchoconstriction, which is soon followed by a moderate but usually prolonged dilatation. Under corresponding conditions the secondary dilatation does not occur if the suprarenal glands have been excised or clamped off before the pilocarpine is injected. This paradoxical dilatation, which is also apparently produced by muscarine, seems to be identical in origin with a number of other paradoxical reactions occurring elsewhere in the body when the suprarenal glands are intact, and may be stimulated to an increased secretion of adrenalin by the pilocarpine. Larger doses of pilocarpine cause constriction of the bronchioles in all animals.

6. Several alkaloids including quinine (and even atropine itself after the broncho-constrictor nerve endings have been paralyzed) cause bronchoconstriction. This appears to be a direct muscular action.

7. After a brief initial constriction nico-

tine causes a dilatation which appears to be due to an increased secretion of adrenalin caused by the nicotine. But if after complete ganglionic paralysis by nicotine a constriction be produced by pilocarpine, then the injection of more nicotine causes a slow, prolonged, but very complete dilatation. The action of the nicotine under these conditions is unexplained.

8. Sodium iodide and camphoric acid do not affect the bronchial nerves. Agaricin seems to depress the bronchoconstrictor endings.

9. The 3:4-dihydroxyphenylethylmethylamine ("epinine"), synthetic adrenalin (Farbwerke-Hoechst Company), chlorine chloride and trimethylamine hydrochloride all produce active bronchodilatation. The orthodioxyphenylethanolamine hydrochloride should also probably be included here.

10. It is very probable that in the normal state and with natural respiration the dilator response of the bronchioles to small quantities of adrenalin is very much more effective than is generally found to be the case in experimental animals, for evidently relief has been obtained clinically from spasmodic bronchial asthma by the hypodermic injection of adrenalin under conditions in which it is extremely probable that not enough of the substance could have reached the bronchioles to produce a dilatation under ordinary experimental conditions with artificial respiration.

ARTIFICIAL PNEUMOTHORAX.

Rist in the *Quarterly Journal of Medicine* for January, 1913, writes an exhaustive paper on this topic. He says that as to clinical results and duration of treatment it is, for the present, absolutely impossible to give a statistical account of the results obtained. Not only does the selection of patients vary very much from one author to another, not only is there a similar variety in the perseverance with which the treatment is continued, but the criterions of improvement or recovery are exceedingly different. Rist's intention, when he began writing this paper, was to put together in a single table all the cases hitherto published and to give percentage figures of the successes, failures, and accidents. He soon realized that this was a hopeless scheme. The reasons are obvious, so much so that the majority of authors have simply published the histories of their cases without even attempting to give a statistical résumé of them.

To judge fairly of the value of the new method, it is necessary to keep in mind two points:

1. Fatal accidents caused by artificial pneumothorax are a thing of the past, and the memory of disastrous occurrences caused by a bad technique ought not to deter us from a method which is now absolutely innocuous.

Not a single example of embolism or of fatal syncope is mentioned in the most extensive collections of histories recently published: Rist states he may quote the papers of Wellman (27 cases), of Keller (40 cases), of Saugman and Begtrup Hansen (33 cases), of Mary Lapham (15 cases), of Samuel Robinson and Cleaveland Floyd (28 cases), of H. Brauns (98 cases), of Dumarest (27 cases).

2. If the attempt to create an artificial pneumothorax is a partial or complete failure, the condition of the patient remains unchanged. The operation itself—and more especially so the puncture method—is absolutely harmless. If adhesions are met which are an obstacle to the introduction of nitrogen, or if only a small, limited, inefficacious pneumothorax is obtained, the patient is none the worse for it; simply, collapse therapy must be abandoned.

Now let us consider the ordinary effect of more or less complete artificial pneumothorax on the type of patients which are more commonly treated with the collapse method, namely, cases of extended one-sided tuberculous infiltration of the lung with cavity, abundant expectoration, and fever. The results are precisely what one would theoretically expect: the amount of expectoration diminishes gradually—sometimes very rapidly—to an extraordinary extent, and at the same time the temperature

is reduced to normal; coughing subsides; the appetite comes back; all the painful and disagreeable subjective sensations caused by fever and intoxication disappear. Patients who previously were confined to bed are able to walk, to talk, to read, and sooner or later to work.

The degree of improvement obtained is proportioned to the amount of collapse established. If the nitrogen is allowed to get partly absorbed, and if consequently the intrapleural pressure falls down under its optional height—which varies according to the patient—coughing and expectoration become more abundant again, fever and malaise come back. It is therefore absolutely necessary to keep the intrapleural pressure to a constant level. But this, with the control of frequent fluoroscope examinations, and provided the patient has some good will and common sense, is a relatively easy task. In many cases the patient can be allowed to live in his home, to resume his work, under the condition of coming once every fortnight or every third week to the physician for a nitrogen injection.

There are few therapeutic results more striking and more gratifying for the physician than the complete transformation caused in a tuberculous patient's life by a successful artificial pneumothorax. In a great number of cases one is entitled to speak of real clinical recovery.

But the problem is not definitely solved when all morbid symptoms have disappeared in the compressed lung, when cough, expectoration, and fever have subsided, even when tubercle bacilli are no more to be found in the sputum. When this condition of restored health has lasted for a certain time, one must try to put an end to compression and collapse, to let the nitrogen be gradually resorbed and the reëxpanded lung resume its respiratory function. To decide when this should be done—in other words, when the treatment should be concluded—is an exceedingly delicate matter. Evidently one ought not to let the lung reëxpand before having good reason to believe that there is not only a clinical but also an anatomical recovery of the tuberculous lesions. No absolute sign can inform us of that. The later the better is a formula to which all authors seem to adhere. Forlanini expresses the opinion that one should in no case wait less than one or two years, and that the treatment will very often have to be prolonged much longer. That the end of the treatment should only consist in abstention from new gas injections, not in withdrawal of nitrogen, is self-evident. Of course, the patient must be followed very closely during this period, and compressions should be renewed at the first sign of activation of old lesions. Only when the patient remains in good health after the nitrogen has been entirely resorbed can one speak of real, complete recovery. That such recoveries can be achieved there are numerous examples in the literature of pneumothorax. Nothing can be more suggestive than to read the extensive case-histories describing them in the various publications Rist has quoted. To give an idea of their amount and value he limits himself to the exposition of results obtained by L. Brauer and Lucius Spengler. These two physicians, working conjointly, published in 1911 the complete histories of the 102 cases treated by them during the five foregoing years. Out of those 102 histories, L. Spengler, in a special publication, has selected the cases in which, after clinical recovery had been achieved through compression, the nitrogen had been allowed to resorb and in which consequently the pneumothorax had been put to an end for at least nine months—excluding all the cases in which pneumothorax was still existent, however striking their clinical recovery may have been. The cases thus selected were fifteen in number. They were all severe cases, with fever, abundant bacilli in the sputum—cavities were evident in eight of them. At the time of Spengler's publication they were all for more than a year without fever, without expectoration, and fully able to work. Of twelve among them the sputum has been examined and was found free from bacilli. A more complete recovery cannot be imagined, and one must confess that no other dietetic, hygienic, or

therapeutic treatment can achieve success of that kind.

What is the functional value of the reëxpanded lung? It sometimes seems to be impaired, and it even happens that the lung can never again enter in contact with the chest wall, a certain amount of gas remaining permanently in the pleural space. Forlanini mentions such a case. But he quotes two other cases in which, for some reason, he had to establish a pneumothorax on the hitherto healthy side, and in which the reëxpanded lung was perfectly equal to its task. In one of his cases the compression had lasted eight years. This evidently contradicts the anatomical and experimental researches which point to a sclerotic degeneration of the healthy compressed lung. But even Forlanini considers the above-quoted case as rather exceptional. In the majority of patients the once collapsed lung remains small and atrophied. The chest wall is deformed as after pleurisy. The visceral and parietal pleuræ adhere to each other, establishing a more or less complete symphysis. In other words, the tuberculous lung after it has recovered through artificial pneumothorax is a cicatricial lung. That it may, however, be up to its function to a more or less satisfactory degree is obvious.

SPARTEINE SULPHATE.

WOLVERTON in *Merck's Archives* for March, 1913, reaches these conclusions as to the value of sparteine:

1. Sparteine, when administered in sufficient dosage, is our most reliable heart stimulant.

2. It is at least as efficient as digitalis, having none of the evil by-effects of the latter, as cumulative action and gastrointestinal irritation. Moreover, it can be used with safety in those cases in which digitalis is contraindicated because of the excessive intra-arterial tension occasioned by the latter. In many cases in which digitalis has failed to provoke a favorable response, sparteine has achieved the desired result.

3. Sparteine is a reliable, quick-acting, non-irritating diuretic, increasing the secretion both of urinary solids and of water. It is the remedy *par excellence* in oliguria and anuria, being valuable both as a prophylactic and curative agent following operative procedures.

4. Unlike many other potent remedies, the cost of sparteine sulphate is not prohibitive, its cost being very low.

5. If one is to confidently expect results from the administration of sparteine sulphate, it must be given in adult dosage of one or two grains, repeated at intervals of from two to six hours, p. r. n. In urgent cases it is best to give 2 grains, hypodermically, and repeat in two hours; then at intervals of three, four, or six hours, as resulting symptoms may dictate.

FORMALDEHYDE AGAINST FLIES.

HOUSTON in the *Indian Medical Gazette* for February, 1913, writes regarding the best way of using formaldehyde in order to kill flies. He found the method of exposing it in shallow plates to be useless. An excellent way is to sprinkle the mixture of formaldehyde, milk, and water in tiny pools of from ¼ inch to about 1 inch in diameter on the floors, shelves, tables, etc., when the flies readily drink it. He used this method during the last rainy season in a jail kitchen with great success.

BEDBUGS AND THEIR DESTRUCTION.

HOOSAIN in the *Indian Medical Gazette* for March, 1913, comments favorably on the plan of Subassistant Surgeon Satkari Ganguli, who, after trying turpentine on bedbugs, writes his experiences in the October, 1912, issue of the *Indian Medical Gazette,* and passes his glowing opinion on its effectiveness in destroying them. This is what Hoosain claimed in his article in the October, 1911, issue of this journal, which was the first article he wrote on the subject.

He further explains fully that he uses the medicinal turpentine (spirit), and to prevent evaporation he makes it into an emulsion of equal parts of soap-suds.

Without soap-suds it has not the same effect, owing to the bedbugs having very smooth and hard backs; the turpentine alone runs off, and they sometimes can slip away and escape destruction. The suds fixes the turpentine to them in a way in which they can never escape with their lives.

THE EFFECTS OF HEATED AND SUPERHEATED MILK ON THE INFANT'S NUTRITION.

COIT in the *Archives of Pediatrics* for February, 1913, reaches these conclusions:

The balance of evidence, both experimental and clinical, points in the main to the same conclusions. Both lines of research show:

1. That there is apparently no serious loss of nutritive value produced by feeding an animal on boiled milk derived from an animal of the same species. At the same time it must be pointed out that the published evidence on this point is scanty.

2. That when an animal is fed on the milk of another species, the milk from which has been found to be suitable for this purpose, such small differences as have been found in the nutritive values of raw and boiled milk have been in favor of boiled milk.

3. That the milk of the same species has a considerably higher nutritive value for that species than the milk of any other species so far investigated.

The evidence dealt with throughout this report emphasizes very forcibly the importance of breast-feeding for the young of all species, and shows the special importance of breast-feeding during the early weeks of life.

When artificial feeding has been employed in animal experiments, boiled milk of a foreign species has given more satisfactory results than similar raw milk. The Berlin figures dealing with infants fed on boiled cow's milk give extremely favorable results, and in view of the evidence collected in this report could scarcely be expected to be surpassed had raw cow's milk been used.

It may be again pointed out that the Berlin babies who are artificially fed receive milk of a known excellent quality. The excellence of the results obtained in Berlin is almost certainly largely due to the care and supervision exercised.

THE DIAGNOSIS OF EXTRAUTERINE PREGNANCY.

BRICKNER (*American Journal of Obstetrics*, January, 1913) concludes an article on this subject as follows:

Patients should be regarded as possibly having an extrauterine pregnancy, who give a history of irregularity of menstruation, of spotting, and of abdominal pain usually of a cramp-like character.

The uterus does not usually correspond in size to the assumed length of the pregnancy.

If, at the same time, a soft tumor can be felt adjacent to the uterus, the diagnosis is probable.

There may or may not be the concomitant signs of pregnancy.

Women seen in collapse with a rapid pulse should be regarded as having an extrauterine pregnancy when other definite conditions are clearly not responsible for the syncope.

THE THERAPEUTICS OF SACROILIAC RELAXATION AFTER OPERATION, LABOR, ETC.

GALLANT (*Monthly Cyclopedia and Medical Bulletin*, February, 1913), after referring to the admirable work of Goldthwaite, Osgood, and others upon this subject, notes that etiologically among the causes of sacroiliac disorder may be classed pregnancy, general lack of tone, twist, strains or direct trauma, relaxation of the lumbar curve of the spine from long recumbency, chronic malformations causing prominent, pendulous abdomen; obesity, tumors, enteroptosis, faulty methods of dress; corsets, shoes, occupations and attitudes, and the various forms of chronic arthritis. The symptoms include backache, pains radiating down the leg, occipital headache, disability, the limitation of bending

movements, discomfort in bed. On examination there may be found alteration in the normal spinal curves, tilting of the pelvis, or prominence of the sacrum. There is tenderness over the joint on deep pressure. Mobility may be demonstrated. When the bone is diseased, swelling and tenderness can be recognized on pelvic palpation.

The correction of sacroiliac subluxation is performed as follows:

Simple hyperextension of the spine by a firm pillow "under the hollow of the back" may, by raising the lumbar spine, draw the sacrum into place.

By placing the patient face down, with the thighs and legs resting on one table, the head and shoulders upon another, and the body hanging unsupported between.

By suspension or hyperextension of the spine. By replacement under ether.

The most striking diagnostic features are that drugs exert but little effect in allaying the pain and wholly fail to cure the disorder; that fixation of the joints in relaxation, and after reduction, when dislocation is present, gives almost immediate relief.

In lumbago the pain is limited to lumbar muscles and readily responds to drugs, heat, and massage. If not, one must look for evidences of sacroiliac luxation.

Goldthwaite is inclined to believe that nearly every case of sciatica is due to compression of the nerve cord by the mobile joint. As to treatment, neither drugs, diet, nor local applications will avail in relaxation of the sacroiliac syndroses.

In relaxation immediate relief is obtained by encircling the pelvis on a level with the anterior spines with adhesive plaster, the ends being lapped over the sacrum and secured from slipping by a safety-pin passed through both layers of plaster. Later this can be replaced by a strong inelastic belt for men or a special corset for women. At times a plaster-of-Paris jacket or a steel brace is needful, followed by a belt for some months until the joint is restored to its natural mobility. Proper corsets accomplish three things for the relief of this condition: they tend to correct vicious balance by carrying the center of gravity backward, thus relieving muscular strain; they partially splint the lower back; they furnish an artificial annular ligament to the glutei muscles.

THE WHITEHEAD OPERATION FOR HEMORRHOIDS.

NOLAND (*Surgery, Gynecology and Obstetrics,* February, 1913), basing his conclusions on 200 consecutive cases operated on by himself and his assistants and covering a period of six years, notes that as the result of this technique there were no cases of serious hemorrhage. There were two cases of constriction of the anal orifice subsequent to operation; both he believed were due to faulty technique, and both were entirely relieved by multiple incisions of the constricting scar with dilatation. One case resulted in partial incontinence extending over a period of three months, with gradual improvement and complete restoration of function at the end of that period. There were no recurrences.

The patient is prepared by giving no food for at least twelve hours previous to operation, and by the administration of castor oil in full dose eight hours before. Ether is the anesthetic of choice. In some cases stovaine was used by subdural injection. The external field was carefully cleansed and the sphincter dilated. The rectum was then flushed with warm water through a sphincteroscope, sponge being deposited well up in the bowel. The external field and the lower rectum are gone over with 60-per-cent alcohol and 1:5000 corrosive sublimate solution.

With the sphincter fully dilated and the hemorrhoidal masses in view, T clamps are carefully placed around the entire circumference of the bowel at the mucocutaneous junction. Care must be taken to grasp only the barest edge of skin. With the left forefinger in the rectum as a guide, an incision is then made through the skin around the entire circle, keeping closely against the upper edge of the clamps. When this preliminary incision has been completed, traction is made on the clamps, and with free strokes of the scalpel the sphincter is ex-

posed. If the forefinger is used as a guide and care be taken that the strokes of the scalpel are made at right angles to the guiding finger and close to the retracting skin margin, a very rapid exposure of the entire circumference of the sphincter can be obtained, with little or no hemorrhage or tearing of the tissues. The lowest attachment of the muscle to the bowel is then freed with a few strokes of the scalpel and the muscle rapidly rolled back, using the side of the scalpel blade or handle, until the hemorrhoidal area is passed. The clamps should now be reset, close together, around the entire circle, grasping normal tissue just above the hemorrhoidal area. Care should be taken that the dissection has been sufficiently complete to allow that portion of the bowel at the upper edge of the reset clamps to be brought to the skin margin free of any tension, and that no portion of the muscle is in the grasp of the clamps. The whole field is then flooded with hot normal saline solution until all oozing has ceased. An incision is now made in the long axis of the bowel extending to just above the line of the clamps, and the first suture is taken from skin through mucous membrane at its apex. The line of sutures is continued around the circumference of the anus by cutting along the clamp line a small section at a time, each section being carefully sutured as cut.

The operation is completed with the removal of the rectal sponge, flushing off the suture line with normal saline solution, and the insertion of a gauze-wrapped rubber tube, about ¾ inch in diameter, thickly coated with iodoform ointment. No tension sutures are employed, the necessity for these being overcome by a dissection extending high enough to make an easy approximation of the parts, absolutely free of tension. Ligation of bleeding vessels is rarely, if ever, necessary. The only bleeding of importance usually encountered is from the vessels in the walls of the rectum proper. By putting a slight lateral tension on each small section as cut, and introducing the sutures at a very slight angle to the long axis of the bowel, the bleeding in these vessels is easily controlled by the sutures alone. Interrupted sutures are employed, the number varying from 18 to 30. Any fine non-absorbable suture material can be used. Noland has found Pagenstecher yarn by far the most satisfactory.

An accurate approximation of gut is essential to the success of the operation, and special care should be taken that there is no puckering of skin or bowel in any way decreasing the size of the anal outlet. Ordinarily, good surgical technique—a careful dissection carried sufficiently high to allow normal gut to be brought to the skin line without tension, the use of many interrupted sutures, with careful approximation of the tissues, bearing in mind always the fact that the anal orifice should easily admit two fingers without tension on the suture line—will give uniformly good results with no fear of stricture, hemorrhage, or infection.

The rectal tube is removed in twenty-four hours. Iodoform ointment is applied two or three times a day for three days. On the fourth day a dose of castor oil sufficiently large to obtain a free evacuation is given. The operative field is flushed off after each defecation, up to the fifth day. The sutures are allowed to separate and come away without interference. This is usually accomplished within ten to twelve days. The patient is allowed to leave his bed on the fourth day, and can usually be discharged from hospital by the seventh day.

PERSISTENT MOUTH-BREATHING FOLLOWING ADENOIDECTOMIES.

Sobotky (*Boston Medical and Surgical Journal*, February 13, 1913) calls attention to the fact that even after operation for adenoids children still persist in breathing through their mouths; that this is too often regarded as simply a habit, and that failure to correct it is regarded as a sign of carelessness or indifference upon the part of the parent. According to Brühl, of Berlin, this persistent mouth-breathing is often due to the fact that the adenoids were not removed until the bony framework is formed with a high palatal arch. In these high

arch cases, mouth-breathing will persist after operation and the patient must be referred to a dentist for the spreading of the arch and the regulating of the teeth. These conditions are also the cause of deviated septum, as there is not sufficient room for the septum to grow straight. This type of case can usually be recognized by the elongated shape of the face and skull. Enlarged lower turbinates, deviation, and spur of the septum are secondary intranasal conditions very commonly found with adenoids. The writer emphasizes the following points:

For the cure of persistent mouth-breathing the nasal exercises have not proven efficient.

An operative treatment of the nasal condition is indicated. Such treatment must be appropriate for the age of the patient.

Patients should have the adenoid removed before the typical high palatal arch is formed.

If this high arch is formed the treatment should be dental, such as spreading the arch and regulating the teeth.

Cutting a slice of mucous membrane from the enlarged lower turbinates, as an aid to nasal respiration, has given good results.

A submucous resection should not be done in children under sixteen.

Electrolysis, using the bipolar method, is effective in reducing the enlarged turbinates, but is not suited for children.

TREATMENT OF ANGIOSCLEROTIC DISTURBANCES OF NUTRITION BY ARTERIOVENOUS ANASTOMOSIS.

WIETING (*Deut. Zeitschr. f. Chir.*, Bd. cxix, Hefte 5 and 6), who introduced the operation of arteriovenous anastomosis for angiosclerotic gangrene or impending gangrene, discusses the successful results and the failures which have followed his operation, and summarizes the present position of the question as follows:

Arteriovenous anastomosis is at present the only means we can employ in the conservative treatment of angiosclerotic gangrene and allied conditions. Arteriovenous anastomosis may be used to avoid a threatened gangrene or, in a case in which gangrene has already occurred, to allow amputation to be performed nearer the gangrenous part than would otherwise be possible. The method is only likely to succeed when certain definite indications are present, and these are, shortly: too much time must not be spent in trying any other conservative measures; the patient must be in moderately good condition, not too old, and must not be suffering from a severe general infection —that is to say, his vascular system must still be capable of a certain amount of accommodation to altered conditions; the local circulatory disturbance must be such that a free venous circulation can be reckoned on; the gangrene must not be very extensive nor spreading very rapidly, and, above all, must not be markedly infected, with the accompanying risk of an ascending thrombophlebitis or severe suppuration in the stump; extensive and progressive angiospastic symptoms modify the prognosis unfavorably, but are not a definite contraindication; the femoral artery must pulsate well if the popliteal is occluded, and the femoral vein must of course be free; each case must be decided on its merits.

The method of choice is a lateral anastomosis between the vessels after cutting out an oval piece from the wall of each, a central ligature of the vein being carried out at the same time. When gangrene is already present the gangrenous portion should be removed at the same sitting without the employment of any complicated flap or plastic method. The arteriovenous anastomosis has no effect on the angiosclerotic process as such, so that recurrence of gangrene as the process advances is a possibility to be reckoned with. The operation, when carried out under the indications given above, has not a high mortality—in fact, if the cases are properly chosen it is almost *nil*. The question as to the feasibility of the operation can never be settled by experiments on animals; at the most these can only be used to explain the beneficial results. The decision as to the indications

for its performance can only be made from clinical observations. Seeing that a number of undoubted successes have been obtained, it must be admitted that the performance of the operation is amply justified.

THE PITUITARY BODY AND ITS DISORDERS.

In a résumé of Cushing's splendid monograph written by GRAY (*Surgery, Gynecology and Obstetrics,* February, 1913) it is stated that the book in large part presents a correlation of a series of experimental investigations with a number of clinical states. The actions of the posterior lobe extract are quite similar to those of extracts of the adrena medulla. There is in addition a powerful galactagogue substance said to be much more potent than that possessed by the extracts of the corpus luteum. The anterior lobe is, relatively speaking, negative. In the glandular transplantation experiments the results thus far indicate some therapeutic possibilities for the method. Certain definite constitutional disturbances were observed in animals which had recovered after partial hypophysectomies, viz., a wide-spread adiposity, nutritional changes in the skin and its appendages, disturbances of carbohydrate metabolism, of body temperature, of growth, and of renal secretion, sexual inactivity or actual atrophy of reproductive glands in some cases, and histological modifications in most of the other ductless glands. Such disturbances simulate some of the clinical syndromes observed in man; and it was these findings that gave the first experimental proof that certain heretofore recognized clinical syndromes are a consequence of lessened glandular activity.

In cases of anterior lobe deficiency (pituitary gland proper) it was found that a thermic reaction occurred after injections of boiled anterior lobe extracts. This has been used as a clinical test of the state of anterior lobe deficiency.

Certain interpretations are drawn by the author from the results of his own and other laboratories: "Normal posterior lobe activity is essential to effective carbohydrate metabolism; an intravenous injection of posterior lobe extract produces glycogenolysis, and its continued administration in excessive amounts leads to emaciation. A diminution of posterior lobe secretion occurring in certain conditions of hypopituitarism (whether experimentally produced or the result of disease) leads to an acquired high tolerance for sugars, with the resultant accumulation of fat.

"The first experience with hypophysectomized adult canines deprived of all but a fragment of the pars anterior disclosed a clinical syndrome adiposity, increased sugar tolerance, lowered body temperature, reversive sexual changes, etc., the experimental counterpart of what will be recognized in man as an adult form."

The production of corresponding hypophyseal defects in puppies later revealed a syndrome (persistence of infantilism and the additional factors of skeletal undergrowth and evident psychic disorders) corresponding with the human typus Fröhlich.

A consideration of the pathological aspects of the gland makes it clear that "in every case of increased intracranial tension, from whatever source, there probably occur secondary changes in the hypophysis, often with gross deformations and resultant functional disturbances which frequently elicit recognizable clinical manifestations."

As to the symptomatology of pituitary body disorders there are certain subjective disorders, characterized by headaches, usually bitemporal, often severe and persistent; photophobia, often accompanying deep orbital discomfort and sensitiveness of the eyes to pressure; deformity of the sella turcica by thickening, thinning, or obstruction, sometimes distinguished only by stereopticon plates.

Choked disks appear late. There is usually a primary atrophy. The amblyopia associated with this primary atrophy more often represents a physiological block to light impulses than an actual destruction of the nerves. Exophthalmos is shown by most patients with tumor. Distortion of the visual field is usually demonstrable.

The supposedly typical bitemporal hemianopsia, with a vertical meridian which bisects the macula, is conspicuously rare. Homonymous defects or tendencies in this direction are at least one-half as frequent as any bitemporal one. The color fields are involved first, later the form. Rarely are the two eyes affected in equal degree. Oculomotor implication is not rare, nor is nystagmus. A history of troublesome epistaxis is very common. It is not unusual for patients to mention an occasional unexpected and intermittent discharge of mucus into the pharynx. Skeletal changes, giantism and acromegaly, are expressions of the same morbid influence. The coarse features of acromegaly include not only an increase in the size of the hair follicles, but also a hypertrophy of the papillæ, with enlargement and activation of the secretory glands, so that the skin becomes greasy and moist. There is also a tendency to hypertrichosis, often marked. The cutaneous features of primary hypopituitarism are quite the reverse. The skin, except in the older patients, is smooth, transparent, and notably free from moisture. Though the hair of the scalp may be abundant, it is otherwise on the body, for the axillary and pubic hair may be almost wanting. When the hypopituitarism originates in adult life there is a tendency for the hair of the head to become thinned. Pigmentation is a conspicuous feature of many of the adult states. Acquirement of an excessive subcutaneous development of fat is particularly noteworthy, accompanied by high sugar tolerance, subnormal temperature, slowed pulse, asthenia, and drowsiness probably incident to a secretory defect of the posterior lobe. The reverse condition—emaciation, spontaneous glycosuria with hyperglycemia, and a slightly elevated temperature—follows posterior lobe administration. Tolerance to carbohydrates seems to increase directly with the degree of hypopituitarism. In many of the outspoken cases of primary, rather than secondary, hypopituitarism, the high assimilation limit has been even more marked, one of these patients being able to retain 450 grammes of levulose with no resultant mellituria; and in this case the presence of a persistent hypoglycemia was demonstrated. It is suggested as possible that the degree of hypopituitarism may be noted by an estimation of the sugar content of the blood. Low arterial tension and slow pulse are common features in hypopituitarism.

As to psychic disturbances there is always a complete indifference to the existing condition. Secondary to hypophyseal lesions the ovaries and testicles show both functional and organic changes. The thyroid gland is also influenced. The symptoms are often present which suggest functional insufficiency of the suprarenal bodies, such as pigmentation of the skin, asthenia, low blood-pressure, and hypoglycemia. There is recognized a homoplastic growth of the pituitary body proper, the so-called struma of the gland itself, a heteroplastic growth arising from some neighboring gland. These are, more strictly speaking, true neoplasms which implicate the hypophysis, if at all, merely through the agency of compression.

No case of acromegaly has been associated with a heteroplastic tumor except one in which a glandular hyperplasia and cerebellar cyst were coexistent; furthermore, in all cases of acromegaly in which a large homoplastic chromophobe struma was demonstrated, evidence of glandular insufficiency had begun to be apparent.

On the other hand, manifestations of primary hypopituitarism always accompanied the heteroplastic tumors which served to compress the gland, and were often an accompaniment, also, of the large chromophobe strumas. These enlargements may occur, therefore, in the glands that have not undergone the primary hyperplastic transformation to which acromegaly is commonly accredited.

From a therapeutic standpoint we are confronted by a variety of problems, some of which call for mere symptomatic medicinal measures, some for operative relief, and some for the administration of glandular extracts to make up for a deficient secretion.

Surgical measures resolve themselves into (1) a sellar decompression (*a*) for persistent hypophyseal headaches, (*b*) for the purpose of encouraging the extension of a glandular struma in the direction of the sphenoidal cells rather than into the cranial chamber; (2) the partial removal of a hyperplastic gland in the active stage of hyperpituitarism; (3) the partial removal of a tumor or struma for the relief of neighborhood symptoms; (4) a subtemporal decompression for the palliation of pressure symptoms when an intracranial extension has occurred; (5) a subtemporal or sellar decompression, or both, to permit of the more favorable and direct application of radiotherapy; (6) the exposure of the brain or of some other organ in case of marked hypopituitarism, for the purpose of implanting a viable gland.

The operation of choice for the majority of cases, as being less mutilating and yet one which furnishes as wide an avenue of approach as any, is a transphenoidal operation through a median inferior nasal opening, reached by sublabial incision and a submucous resection of the vomer, the turbinates being flattened but not removed. The essential precautions are: (1) to be correctly oriented in regard to the sphenoidal cells, so as to avoid a misdirected approach to the posterior ethmoidal region; (2) to be sure of the local condition by a careful stereoscopic study of *x*-ray negatives, and to operate under their guidance; (3) to have perfect anesthesia; (4) to have the courage to withdraw for a second session in case there is any uncertainty as to the character of the tissue exposed after incising the pituitary capsule.

Among other theapeutic measures is glandular administration. Animals suffering from a known deficit of glandular secretion could be benefited by injections of extracts, by glandular feeding, or by implantations of hypophyses from other sources. This applies to human patients also, though "the therapeutic administration of extracts by mouth is fraught with many disappointments." Hypodermic and intravenous administration of the extracts is definitely more effective, although the whole question of gland transplantations is still very unsettled. Doubtless much may be expected from these measures in the future.

With radiotherapy, the results have been encouraging thus far. The failure to substantiate the earlier claims for the rays in exophthalmic goitre, however, prepares one for a possible like disappointment here.

A CONSIDERATION OF SEVENTY-SIX OPERATIONS IN WHICH LANE BONE-PLATES WERE USED.

BARTLETT (*Boston Medical and Surgical Journal,* Jan. 30, 1913) reports on 76 patients. In 7 the clavicle was fractured; humerus, 17; radius, 1; radius and ulna, 3; ulna, 4; femur, 17; tibia, 15; tibia and fibula, 9; fibula alone, 3.

Half of these patients have been traced for periods of two to twenty-nine months since operation. The other 36 are known to have left the hospital alive, and most of them in better shape than when they entered. Many of them walked out in full health, without dressing, splint, or crutch, but some were removed in the original cast and dressing at the end of one or more weeks.

Among the 38 who have been traced, there were 22 simple and 16 compound fractures. Of the latter, 12 were fresh or granulating when the plate was introduced, while 4 were suppurating at the time of operation.

Of these 38 patients, 13 are known to have had their plates removed. Four plates had to be taken out in simple fractures and 9 in compound.

Seven of these 38 results are considered failures by Bartlett. These were reported in detail. The mortality has been 3.9 per cent. This cannot be properly credited to the method as such but rather to the operation. As to the indications for open treatment no general statement will ever cover all the cases, since special considerations are bound to influence treatment of certain individuals. One thing is sure, that in spite of the most satisfactory advances of recent

years, hardly any operative procedure is wholly without risk; hence he feels that we must, before subjecting any bone case to operation, show very definitely operative risk here involved.

So much for a positive contraindication; now for relative considerations. It has been urged that anatomical perfection is of vast importance, but this must be modified to apply only under certain considerations. As a matter of course a big callus or deformity on an exposed bone, especially in a female, is a matter of importance and to be avoided by all means.

Extreme shortening of a long bone is not to be treated lightly, but can be met otherwise than by plate, etc. Indeed, it may not be out of place to recall, in passing, that anatomical perfection is frequently at variance with complete functional utility, and that the two terms must not be regarded as synonymous.

Many authors, Bartlett among them, have in their enthusiasm for open treatment urged as a reason for its use the likelihood of soft tissues getting between the ends of bones and thus preventing union; this is one of the many traditions which have been handed down from nobody knows whom and repeated in a somewhat thoughtless way. In more than one hundred open operations for fracture Bartlett has been impressed that the soft tissues very frequently were found between the fragments. Now if this occurs in the patients who are operated upon, does it not also occur with corresponding frequency in those who are the subjects of conservative treatment? But we know that a far greater majority of bones which are treated by closed methods unite solidly. If these two premises are admitted, the only logical conclusion is that the bugaboo of soft part interposition has been greatly exaggerated.

The only indication for operation which stands out prominently above all the others is a functional defect, either proven in an old case or predicted with a reasonable degree of assurance in a recent one.

It may with propriety be asked how we are going to predict a functional need in a fresh case. Of course this can only be done within certain limits, which no doubt will vary greatly in individual cases.

There is not much difficulty in predicting functional impairment when a fracture near a joint results in a deep-seated and dislocated fragment too short to handle. The obvious result of a large callus in such a situation is limitation of movement.

As a matter of course the patient's occupation influences our choice of a therapeutic procedure. A plasterer or fresco painter must reach above his head, and in consequence needs a better clavicle than do the rest of us. A professional pianist must have arms which are above reproach as far as function is concerned. The same can be said of the legs of professional dancers, etc.

In addition to the above general statements on function, it may be said that an open operation is thought desirable in Dr. Bartlett's service:

When a leg must be gotten out of bed early.

In old cases of non-union or extreme mal-union.

It is, of course, desirable in all fresh widely open fractures if shock be past.

In chronically infected cases in which the bones lie bare. All compound wounds, whether suppurating or not, are to be packed and allowed to granulate. Generally speaking, the patient must always be a good surgical risk.

Every surgeon who has had personal experience in the use of Lane's bone-plates appreciates that, in the treatment of recent fractures, no open operation is justified unless ideal approximation is to be obtained. This means that all the fragments must dovetail perfectly.

Great difficulty is often experienced in perfectly lining up two main portions of a broken long bone. A few millimeters tend almost invariably to prevent the axes of both from coinciding. To meet this need two instruments have been described by Bartlett.

Lane urges and practices, as is well known, an asepsis which must be more

rigid than any which has been used heretofore in general surgical work. He says no one has a right to attempt operations for fracture who is not prepared to prevent any exposure of the skin; to keep his hands from ever coming in contact with the tissues or with those portions of the instruments which do come in contact with the tissues; nor are needles, sutures, or ligatures to be handled with other than sterile instruments at any time. Rubber gloves cannot be trusted to come in contact with tissues, blades of instruments, needles or threads, because of the possible contact with other things or of a minute hole in the gloves.

A NEW METHOD OF DIAGNOSTICATING RENAL TUBERCULOSIS.

BUERGER (*American Journal of Surgery*, February, 1913) in a doubtful case removed from the left ureteral lip a number of pieces of edematous mucous membrane by means of his operating cystoscope and punch forceps. Microscopic examination of sections showed numerous miliary tubercles in the submucous tissues. He remarks that it has been shown definitely that the excision of mucous membrane of the ureteric meatus may yield tissue containing miliary tubercles, at a time when no positive evidences of tuberculosis of the kidney are at our disposal.

Miliary tubercles may be present in such tissue, although the only visual alterations of the mucous membrane are those which appear as "edema" even to the trained eye.

Such excised pieces make a positive diagnosis possible when the ureteral catheter fails us, when the guinea-pig inoculations are negative, when the urine is perfectly clear, and when the patient is presenting practically no symptoms.

Concentration and focalization of the tuberculous process at a ureteric meatus may occur early in the disease.

Such miliary tubercles may be found in the ureteric ostium even though the rest of the ureter is almost free from tuberculous change when the pelvis of the kidney too is but slightly affected.

Cystoscopic biopsy should be performed on the ureteric orifice of the affected side in all cases of suspected renal tuberculosis where the ocular evidences are sufficient to warrant a suspicion of renal involvement; also whenever tubercle bacilli cannot be demonstrated, and whenever positive evidences of the presence of a tuberculous process in the kidney are lacking.

SPINAL ANALGESIA.

HOUGHTON (*Journal of the Royal Army Medical Corps*, vol. xix, 1912) after referring to the pioneer work of Corning and Bier alludes to the arrangement of the nerve roots at the lower end of the spinal cord, grouped as they are as the right and left bundle, with an intervening open space from 2 to 5 mm. in width, on a level with the second lumbar vertebra. Lower down the nerve roots are more evenly spread out, filling the whole space, but leaving free room for the cerebrospinal fluid to filter through. In the cauda equina the motor roots are situated in the anterior portion, and the sensory roots in the posterior.

Upon the outer surfaces of the dura, in the epidural space, especially at the sides, are rich venous plexuses and loose adipose tissue.

The distance from the skin to the dural space is, in the lumbar region, generally from 4 to 6 cm., but in men with well-developed muscles it may reach a depth of from 7 to 8 cm., and in fat persons even to 10 cm.

As to the size of the spaces between the arches of the lumbar vertebræ, the third and fourth are, as a rule, larger than the first and second, while the fifth is narrower from above downward, but wider from side to side.

In abnormal cases the spinous processes of the lumbar vertebræ may, however, cover each other in a tile-like manner, rendering the introduction of a needle impossible.

There is normally present about 50 to 150 Cc. of normal cerebral spinal fluid. Pressure in the lumbar region is in the recumbent position equal to 60 to 100 mm.

of water. Changes in posture affect to a high degree the position of the cerebrospinal fluid. If a coloring substance in solution be injected in the lumbar region, followed by a high Trendelenburg posture, the coloring matter will appear at the base of the brain. The importance of this relative mobility of the cerebrospinal fluid can scarcely be exaggerated, and it is especially important that the poison should not reach the vital centers in a condition of concentration. In order to prevent such a poisoning of the entire cerebrospinal fluid, and to be able to tell precisely which point is being exposed to the effect of the anesthetic, Barker employs for injection only solutions heavier than the cerebrospinal fluid. If, moreover, by the addition of a suitable substance a different viscosity be given to the solution to be injected, this will with difficulty mix with the cerebrospinal fluid, and just as a bead of mercury easily changes place in a tube filled with fluid and always stays at the most dependent point, so, by changing the posture of the patient, we can always calculate at which particular point the local anesthetic is being deposited, and by placing the patient in a suitable position we can prevent the poison from reaching the cervical region of the cord *en masse*.

In spinal analgesia it is important to employ the anesthetic in such a form as will do the least amount of injury to the tissues. In this respect the toxicity of the injected fluid in the spinal canal is not such an important factor as it is in the case of injections used to produce local anesthesia.

Houghton holds that the choice of anesthetics lies between tropacocaine and stovaine.

The depth and duration of the analgesia produced by similar doses of either drug are practically the same; while complications such as headache or nausea are not more frequent after the use of the one or the other.

There are only three ways by which analgesic solution injected through the second lumbar interspace can make its direct effects felt in the mid-dorsal region, or even higher, as is sometimes the case in this procedure. These are either (1) by slow diffusion; (2) by a shifting upward of the whole column of cerebrospinal fluid in which it is suspended; (3) by gravitation, if the injected compound is heavier than the liquor spinalis.

It is easy to observe the behavior of one fluid injected slowly into another, if the fluid be colored with an aniline dye. If both have the same temperature and specific gravity, the injected fluid forms at first a distinct colored cloud, which slowly diffuses through the mass into which it enters if the latter is in a state of rest.

On the other hand, if the injected fluid has the same temperature, but a greater specific gravity, it sinks rapidly in a definite stream to the bottom of the second fluid, and remains there as a distinct stratum without diffusion for a period proportionate to its density and viscosity. A consideration of these points shows that if we aim at localizing a spinal injection to any particular region of the cord we can utilize the force of gravity acting upon an injected compound of greater density than the cerebrospinal fluid. Thus the heavier injection sinks to the lowest part of the canal, independently of any displacement of the liquor spinalis. Here it remains, more or less undiluted, in contact with the surrounding structures.

A 5-per-cent solution of tropacocaine has a specific gravity of 1.0106, which is considerably higher than the specific gravity of the cerebrospinal fluid, 1.007. This probably accounts for the undoubted success which has attended the use of this compound.

A 5-per-cent solution of stovaine in distilled water has a specific gravity of 1.0064, and a freezing point of 0.0585° C. This solution is lighter than the cerebrospinal fluid, and will not gravitate, but will slowly diffuse at the place of injection.

We cannot, therefore, expect to obtain exactly uniform results if we employ solutions of widely different densities. A failure to appreciate this may largely account for the irregularities which have been reported in the action of these drugs.

To raise the specific gravity of the stovaine solution, Barker has added 5 per cent of glucose to the injected fluid, so that a solution containing 5-per-cent stovaine plus 5-per-cent glucose, and distilled water 90 per cent, has a specific gravity of 1.0230.

This solution is heavier than the cerebrospinal fluid, and will, on injection, gravitate to the lowest portion of the spinal canal. The glucose has no irritating effect when thus injected, and beyond rendering the solution slightly viscid, and thus helping localization, its addition has little or no action on the contents of the canal.

With such a solution of comparatively high density and viscid character, diffusion and consequently dilution of the stovaine is limited. Thus, a smaller dose can produce a full effect, and the drug by means of gravity can be so localized as to exert its specific action at the desired level of the cord.

For use in spinal analgesia the "Record" syringe of 2-Cc. capacity is the best. The needle has a close-fitting stylet, and the point is oblique and hollow so as to secure sharpness without too much lengthening of the terminal opening. As the operator is dealing with very small amounts of injection fluid, and the loss of two or three drops would make a considerable difference in the extent of the analgesia, a means has been devised by Barker to insure the delivery of all the injection compound through the point of the needle. This consists of a second cannula slender enough to fit the first hollow needle loosely, and long enough to project beyond its point about 1 mm. when pushed home.

Our next consideration is how to pierce the lumbar dural sac with the point of a needle, and through it inject our analgesic solution below the level of the spinal cord.

The configuration of the bones below the fourth lumbar spine makes a needle puncture here a matter of great difficulty, so that our choice of a spot for puncture is restricted to the second or third interspaces of the lumbar vertebræ. Here the sac can be reached between the lamina or the needle can be thrust exactly in the middle line between the second and third, or third and fourth, spines.

It is now generally acknowledged that puncture in the middle line is the easiest and safest method. Here the puncture is least painful, and there is less risk of wounding any nerve structure or vessel if the needle is kept true to the middle line and only just penetrates the dural sac completely.

At either side there is a possibility of touching the strands of the cauda equina. Besides this, any small amount of fluid injected in the middle line can spread freely through the liquor spinalis, whereas if delivered among the nerves of the cauda equina on either side it may be entangled there, and tend to pass upward or downward in their interstices on that side only, and so fail to reach the general cavity of the spinal sac. This may produce an effect too low for the contemplated operation, or a one-sided analgesia.

The middle line, therefore, is the preferable site for the entrance of the hollow needle. Here the analgesic compound passes freely into the spinal fluid, and can move unhindered upward or downward from the point of entry.

A convenient guide to the site of injection is the fourth lumbar spine, which is on a level with the highest points of the iliac crests: a line joining these two points across the back will indicate this spine. The hollow needle is thrust through the skin just above this point or just above the third spine and its point aimed straight forward and a little upward. If this is accurately done, no difficulty as a rule is experienced in reaching the middle of the dural sac.

In some very stout people the spine may be difficult to feel with the finger, and the point of the needle may strike bone; its upward slant is then changed, and the needle point thrust in a lower direction.

This usually suffices to pass the spine without the necessity of a fresh skin puncture if the back has been well rounded, in order to obtain the greatest amount of separation between the lumbar spines. With a

little practice lumbar puncture becomes quite easy, though in early attempts some difficulty may be encountered. Whether during the puncture the patient should sit on the edge of the table with the back rounded to its maximum, or lie on his side with the knees well drawn up, depends on the site of the operation and the height of the required anesthesia.

Spinal puncture is certainly easier in the first position. To illustrate the procedure, let us take a case requiring operation for appendicitis. Here we must aim at obtaining analgesia up to the ensiform cartilage, which means that the analgesic solution must be brought into contact with the nerve-roots as high as the sixth dorsal vertebra.

The needle, cannula, and syringe are boiled for ten minutes in plain water to insure their sterility. When cool, the cannula is fitted to the nozzle of the syringe.

An ampoule containing the sterile stovaine-glucose solution is now taken and the end is broken off. The cannula is introduced through the broken end and the fluid is drawn up into the syringe. Bubbles are dislodged and all fluid except the required dose is expelled, and the syringe laid aside on a sterilized towel.

The patient has meanwhile been placed on the operating table and his confidence established by a few words.

The skin over his lumbar region having been previously cleansed as carefully as the area for operation, the position of the patient on the table now demands the operator's most careful attention. For an operation on the right side of the body, he is placed lying on that side, so that the nerves to that region may be most deeply affected.

His head and neck are raised on pillows, and to insure that the analgesic solution reaches the sixth dorsal segment, the buttocks are raised by a padded one-inch board placed under his right trochanter. This raises his pelvis about one inch or sufficiently high to cause the sixth dorsal vertebra to be the most dependent part of his spinal column.

Great care must be taken that the head and neck are sufficiently raised to prevent the injected fluid from running higher. His knees are then flexed on his abdomen, and his back is rounded as much as possible in the lumbar region. The skin is now fully cleansed and a sterile towel is laid across the pelvis, through which the iliac crests are felt and the fourth lumbar spine determined.

The skin on either side of the selected interspace, second or third lumbar, is then steadied by two fingers, and the needle with stylet in position is sharply thrust through the integument in the middle line to a depth of one inch. The stylet may now be withdrawn. The needle is then pushed firmly through the interspinous ligaments until the dural sac is punctured, when the spinal fluid flows out in rapid drops, or more rarely in a continuous stream. This flow of cerebrospinal fluid is most important, as it is our only guarantee that the sac has been reached by the needle. If the drops come slowly, the needle-point may not be completely within the sac; it should then be rotated on its long axis, when a faster flow usually issues from the stem. In no case should the analgesic solution be injected until the flow of spinal fluid is satisfactory.

When 2 or 3 Cc. of liquor spinalis have escaped into a measure-glass, the slender cannula attached to the loaded syringe is inserted through the hollow needle and pushed gently home; the measured solution is then injected into the sac by a slow thrust of the piston. The needle, cannula, and syringe are now rapidly withdrawn together, and the puncture is covered with sterile plaster.

Throughout this procedure the patient is lying on his side, and the position is still maintained for two or three minutes. By this time the solution has gravitated to the most dependent part of the spinal canal and produced its analgesic effect on the side on which he is lying.

The height of the analgesia is now noted, and if satisfactory, the patient is gently rolled on to his back, when the left side of his body quickly becomes analgesic.

The board elevating his pelvis may now be removed.

As a rule, two minutes elapse after the injection before the patient feels a numbness in his feet; then the perineum becomes analgesic, and later the trunk as high as the nerve supply reached by the injection.

A screen should now be placed in front of the patient, as it is seldom desirable that he should see the manipulations of the operator, and if possible an assistant or nurse should converse with him and so distract his attention from the matter in hand.

At the conclusion of the operation the patient should be gently lifted into bed with his head and shoulders raised.

For an operation on the perineum a simpler process is available. Here the analgesia is not required at a high level, so no elevation of the pelvis is necessary. After completion of the usual preparations, the patient is placed in a sitting posture across the end of the operating table. His feet rest on a chair, and he is directed to place his elbows on his knees and his head in his hands, and so to round his back that the greatest separation is obtained between the lumbar spines. The fourth lumbar spine is defined and the needle thrust into the skin immediately above it. When the lumbar sac is reached the injection is carried out as described, and the patient is then gently moved into the lithotomy position with his head and shoulders well raised. In two or three minutes the anus becomes insensitive and its sphincters completely relaxed, when the operator can proceed to work.

A notable point in this procedure is the complete muscular relaxation which is obtained both after the use of the tropacocaine and stovaine.

This is especially remarkable during anal and abdominal operations. The muscles are found flaccid and toneless and there is an entire absence of that straining which so frequently hampers a surgeon in cases in which a general anesthetic is employed.

The most constant phenomena following an injection of this solution are first a loss of the knee, plantar, and cremasteric reflexes; subjective sensations of numbness and tingling in the feet; analgesia of the perineum, feet, legs, scrotum, and penis, gradually reaching the abdomen. Sensation of pain is lost before that of heat and cold, while tactile sensation is the last to disappear and the first to return as the effect of the drug passes off.

During the operation, usually about fifteen minutes after injection, the patient sometimes becomes pale and sweats, he may be nauseated and vomit, but as a rule this passes off in five minutes. The pulse-rate is usually slowed, and the blood-pressure lowered.

Respiratory distress, as evidenced by "air-hunger" and inability to cough, is sometimes keen. This is dependent on intercostal paresis from high analgesia, but it does not affect all patients to the same degree, the element of nervous apprehension being more marked in some than in others.

On the return of sensation the patient often complains of a headache, which is seldom persistent or severe, and generally yields to a dose of bromide. Vomiting occasionally occurs, but is not prolonged. The temperature is nearly always raised to 100° F. for forty-eight hours, when it returns to normal.

Later sequelæ have been reported, such as paralysis of the ocular muscles and paraplegia, but one cannot avoid the conclusion that these were due to a faulty technique.

The stovaine-glucose solution, which has now been in use for six years, can be obtained in glass ampoules, each of which contains about 2 Cc. of a 5-per-cent solution of stovaine and glucose.

The filled ampoules are carefully sterilized by boiling at 110° C. before being finally sealed. The amount of this solution necessary for injection in any one case should not exceed 1.2 Cc. or 6 cg. of stovaine. One cubic centimeter of this solution containing 5 cg. of stovaine usually produces an analgesia up to the level of the umbilicus, lasting from fifty to sixty-five minutes.

The amount of danger during the actual narcosis appears to be in direct ratio to the

height of the analgesia. So long as the diaphragm is able to perform its function, danger to life is trifling. This is now well recognized, yet the production of analgesia above the nipple line is often attended by a feeling of faintness and air-hunger in the patient due to paralysis of the intercostal muscles. Though not dangerous, this is unpleasant and can be avoided. Headache on the evening following the operation is fairly frequent. It usually disappears after a dose of phenacetine or bromide.

Cases of paralysis of the ocular muscles have been reported on the Continent, but in several thousand cases in which Barker's technique, as above described, has been employed, it has only once been noticed, and then was of a temporary character.

The range of applicability may now be considered, and although successful operations on the head have been reported by Jonnesco with a stovaine-strychnine injection, these were not unattended by accidents.

Operations, however, such as the radical cure of hernia, appendectomy, and operations on the bladder and rectum are particularly suitable for spinal analgesia. In fact the author uses spinal analgesia as a routine method for all operations below the level of the umbilicus. This means that the injection fluid must reach the sixth dorsal segment.

This method has also been used for gastroenterostomy and operations on the kidneys, and for the removal of pieces of rib, but the author does not attempt to produce analgesia in any region supplied by nerves above the fourth dorsal segment.

Having lately completed a series of 400 operations under spinal analgesia at the Cambridge Hospital, Aldershot, in all of which the injection was quite satisfactory, and in none of which was there any cause for anxiety as to the patient's condition, he concludes by recommending the method to those engaged in surgical work as it is most useful in the army.

REVIEWS.

PSYCHANALYSIS: ITS THEORIES AND PRACTICAL APPLICATION. By A. A. Brill, Ph.B., M.D. Philadelphia and London, W. B. Saunders Company, 1912.

Those who are unable to read German are under obligations to Dr. Brill for the presentation of Freud's views in the English language. Much of the attention which a new theory excites is often due not so much to its merits as to its novelty and obscurity. In the treatise before us Freud's views are presented robbed of their mystery and in all their nakedness.

Freud's theories as to the sexual origin of the various symptoms of nervous and mental diseases—his theory of the repressed painful memories, the result of sexual traumata received in childhood and early life—are so well known as hardly to require comment in a review. It is sufficient to say that Freud ignores all other causes for these affections. The sexual interpretation of the origin of nervous and mental maladies is expanded to its utmost limits. Not only is the theory of painful memories of sexual traumata carried into the explanation of the various psychoneuroses, but it is applied, as is well known, to the explanation alike of dreams, of dementia præcox, and of paranoia. How far the psychanalysts have gone in the application of Freud's theories is seen in the explanation which they advance of homicide by paranoiacs. According to this interpretation a delusional lunatic does not commit murder because his victim has been the arch conspirator, the one great cause of the paranoiac's persecution and suffering, but because the paranoiac is homosexually in love with his victim and slays the latter because that homosexual love is not returned. Let him believe who will! This may be safely left to the individual experi-

ence of every one who has had to deal with criminal lunatics. In not a single instance of the not inconsiderable number of paranoiac homicides studied by the reviewer is such an explanation even remotely applicable.

The volume before us portrays the rather unpleasant aspects of the theory in a very unattractive form. Perhaps this is inherent in the theory itself, but the reviewer thinks that it would have been possible to have presented so unpleasant a subject in a more dignified manner. Perhaps on the other hand it is just as well that the rendition into English should have been as literal and uncompromising as possible, and because of the wide-spread attention which the theory is receiving at present we recommend that every one interested in nervous and mental diseases should read this book. In all fairness no view should be condemned without a proper hearing.

As to the ultimate practical results of the application of Freud's theories, they can be estimated in the statement that it takes from six months to three years to cure a case, and secondly, that the case must be carefully selected both as to age, education, and other qualifications.

F. X. D.

A Text-book of Physiology. By Isaac Ott, A.M., M.D. Fourth Edition, Revised and Enlarged. Illustrated with Half-tone and Other Engravings, Some in Colors. The F. A. Davis Co., Philadelphia, 1913. Price, $3.50.

The first edition of Dr. Ott's book appeared in 1904—nine years ago. The fact that it has passed into four editions in that space of time indicates that it must have proved of value not only to his own students but also to the students of other teachers as well. As we pointed out when reviewing the first edition, the volume is by no means a complete or exhaustive treatise upon the subject of which it treats. By the use of thin but excellent paper the bulk of the volume has been kept within a very reasonable size, although there are 900 pages.

For many years Dr. Ott has been recognized not only as a teacher of this branch of medicine, but also as a constant investigator in physiology and pharmacology, and his text and illustrations reveal the fact that he tells his reader not only what is to be found in physiological literature, but of what he himself believes as the result of his investigations. To the active practitioner who looks back with regret to the fact that he paid too little attention to his lectures on physiology while a student, and recognizes that it is essential for him to keep abreast of the science, if he is to be a skilful physician, this book can be cordially recommended, as it contains much information of a nature which can be applied to practical clinical medicine. It is a well written history of the physiology of to-day without any attempt to go into the minute details of laboratory instruction.

International Clinics. A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles. Edited by Henry W. Cattell, A.M. The J. B. Lippincott Company, Philadelphia and London, 1913. Volume I, Twenty-third Series.

The object of International Clinics is so well known to our readers from the notices which we have published of previous issues that it is only necessary to call attention to the contents of the present volume. The first fifty-one pages are taken up with articles dealing with diagnosis and treatment. Beginning with one by Dr. Malsbary upon the Treatment of Poliomyelitis, there is another one by Dr. Albert Abrams upon the Treatment of Aneurism, in which his very original views in regard to certain therapeutic procedures are described. In Medicine there is an interesting paper by Dr. Freeman upon Protein Sensitization and its Relation to Serum Therapy, and another upon Intestinal Autointoxication by Dr. Sommerville. In the department of Pediatrics the two articles are devoted to mental conditions in children. In that devoted to Surgery is one upon the Surgical Treatment of Epigastric and Umbilical Hernia, Combined with Lipectomy in Certain Cases. Perhaps to the general surgeon the article by Dr. Rugh upon the Report of Ten Cases Operated upon for Pott's Dis-

ease by Albee's Method of Bone Grafting will prove the most interesting. The volume closes with an article covering one hundred and ten pages by the Editor and Dr. Johnson upon the Progress of Medicine During the Year 1912.

SOLIDIFIED CARBON DIOXIDE. By Ralph Bernstein, M.D. The Frank S. Betts Company, Hammond, Indiana, 1913. Fully Illustrated.

Solidified carbon dioxide is now so largely used in the treatment of cutaneous tumors and other skin diseases, not only by dermatologists but also by general practitioners, that this little book is timely and interesting. The author has evidently had adequate opportunities of determining the value of this remedial measure. A large number of illustrations showing typical cases successfully treated by this plan are included. There can be no doubt that carbon-dioxide snow has reached a permanent place in therapeutic procedure, and this book will help the profession to thoroughly understand it.

A REFERENCE HANDBOOK FOR NURSES. By Amanda K. Beck. Third Edition, Revised and Enlarged. The W. B. Saunders Company, Philadelphia, 1913. Price $1.25.

This small pocket-size, flexibly bound volume is pretty well described in its title. Its contents are essentially practical. The fact that it has reached a third edition proves that it has been useful to the class of readers for which it was prepared. Although there are less than two hundred pages of text it covers a very wide field. Beginning with abbreviations which are commonly used in medicine and particularly in prescriptions, it gives a brief glossary of Materia Medica, Roman numerals, popular and official names of medicinal preparations, weights and measures, tables for percentage solutions, action, uses and doses of the most important drugs, poisons and antidotes; and all this within the space of thirty-seven pages. It then gives a number of formulæ for salt solution and other solutions which are commonly made up by nurses for physicians. Two pages are devoted to urinary analysis and six pages to infant feeding. So far we have described only the contents of the first seventy pages, and when we add that almost every department of nursing, and anatomy, obstetrics, foods for the sick, massage, baths and packs, emergencies, methods of sterilization and the nursing of infectious diseases are discussed in the remaining pages, some idea of the degree of condensation which has been attempted can be gained. Almost every nurse can use this little volume with much advantage, turning to it in spare moments when she is at a loss to know how to perform some function which she is called upon to carry out.

THE HEALTH CARE OF THE BABY. A Handbook for Mothers and Nurses. By Louis Fischer, M.D. Fourth Revised Edition. The Funk & Wagnalls Company, New York, 1913.

For a number of years Dr. Fischer has been known as one of the leading specialists in diseases of children in New York, progressive, and keeping abreast of the latest advances in his specialty. As the title indicates, the book is not intended for medical men, but almost every young graduate and some old ones can obtain many useful hints from a perusal of its pages. Furthermore, the author has accomplished the difficult task of preparing the medical text for lay readers without being too crude or too scientific in his descriptions.

NERVOUS AND MENTAL DISEASES FOR STUDENTS AND PRACTITIONERS. By Charles S. Potts, M.D. Third Edition. Revised and Enlarged. Lea & Febiger, Philadelphia, 1913. Price $2.75.

This is one of the smaller useful accurate handbooks dealing with neurology, containing a little less than six hundred pages of text, prepared by one who during the last three decades has been actively engaged in the care of nervous patients, particularly in hospitals and institutions designed for their relief. The illustrations are all practical and useful. The medical man who wishes to have on his shelves a complete and exhaustive work dealing with neurology will not wish this volume, but the general practitioner who desires a book to which he may turn when pressed for time for accurate information which will aid him in

reaching a diagnosis and instituting proper treatment will have his needs fully met by the volume before us.

PRIVATE NURSING. By Katharine DeWitt, R.N. The J. B. Lippincott Co., Philadelphia, 1913. Price $1.00.

We have recently called attention in the GAZETTE to another book along these lines. There can be no question that while hospital training is an excellent preparation for general nursing, it lacks much in the way of preparing the nurse for performing her duties in a private household. In the twenty-two chapters of this small book the authoress takes up, first, the necessary qualifications for the nurse, considers the relation of the nurse to the family, the nurse and her patient, her bearing toward the physician, the records she should keep, the preparations she should make, discusses the question of contagious diseases, takes up hotel life and traveling with patients, and finally concludes with a chapter on the old nurse, which is amusing and interesting. One often wonders what becomes of all the old nurses, so-called. This chapter is designed to make the way easier for the old nurse who does not try to solve the matter by matrimony.

THE INTERNATIONAL CLINICS. A Year Book of Treatment and Practitioners' Index. E. B. Treat & Co., New York, 1913. Price $3.50.

This is the thirty-first year of the International Medical Annual, and the contributors to it maintain the high reputation of their predecessors. As usual the illustrations are exceedingly good. The summarizations of some of the articles are necessarily so brief as to be somewhat disappointing, but taking it all in all, the volume affords a fairly complete and accurate summarization of medical literature, rather as a clue than as a competent discussion of the papers themselves. The conclusion reached by one of the contributors to the effect that the wiring operation for aneurism has been proved of little value and should be cast aside, only goes to show that he has had no experience in this line of giving relief to otherwise hopeless cases.

WHEN TO SEND FOR THE DOCTOR AND WHAT TO DO BEFORE THE DOCTOR COMES. By Frieda E. Lippert, M.D., and Arthur Holmes, Ph.D. Fully Illustrated. The J. B. Lippincott Co., Philadelphia, 1913. Price $1.25.

The authors of this small octavo volume of less than three hundred pages have succeeded in presenting a very useful summary of the facts which are naturally included under the title that we have just given. The book is divided into five parts. The first part deals with simple non-contagious and contagious diseases, in turn divided into ten chapters dealing with the baby's cries, cold, sore throat, fever, sick stomach, bowel troubles, headache, skin eruptions, contagious febrile diseases, and contagious diseases of the eye. There is a special chapter upon simple and serious nervous disorders. Another chapter is upon some of the habits of childhood, and still another upon physical and mental cases of retardation of development. The last five chapters, which form Part V, deal with what to do before the doctor comes for wounds, burns and scalds, unconsciousness, fractures, dislocations, sprains, and poisons. It goes without saying that much of the material is so condensed as to be of limited value. Under "Carbolic Acid" nothing is said about the use of sulphate of magnesium. The recommendation that sulphate of copper be used as an antidote for phosphorus poisoning is antiquated and valueless. It is questionable, too, as to whether "any medicine at hand which contains iron" would be of value in arsenical poisoning unless it was some form of hydroxide of iron.

SURGERY: ITS PRINCIPLES AND PRACTICE. By Various Authors. Edited by W. W. Keen, M.D., LL.D. Volume VI, Illustrated. W. B. Saunders Company, Philadelphia and London, 1913.

In the seven years which have elapsed since the publication of the first volume of Keen's System of Surgery progress in many departments of the art has been so rapid that while there is little to discard there is much to add. Hence the authors of the articles comprising the System were individually asked to furnish such supple-

mentary matter as would bring their chapters fully abreast of the present status of surgery. Moreover, it has been needful to add some new chapters upon Tracheal Insufflation; Newer Methods of Anesthesia by Nitrous Oxide; Intravenous Ether Anesthesia; Surgery of the Hypophysis; Treatment of Cancer by Fulguration and Desiccation; Use of Iodine as a Disinfectant to the Wound and the Field of Operation; and the Use of Salvarsan. More particularly has it been needful to present systematically and in adequate detail the newer thoracic surgery.

There are in this sixth supplementary volume the writings of more than sixty contributors. It contains upwards of a thousand pages. Of major import to those who use this book in its entirety as a working basis it has an admirably arranged and very complete general index.

The first chapter, upon Inflammation, is contributed by Adami in his customary vivid and charming style, embracing a condensation of recent knowledge upon this subject. To the last brief page and a half by Ochsner on Surgical Organization of the Hospital the book is worthy of highest praise; indeed, it represents a summarization of recent knowledge at the hands of, as a rule, experts, which is truly invaluable not only to him who has for years used the other volumes of this system, but also to him who does not possess them.

MANUAL OF SURGERY. By Alexis Thomson, F.R.C.S. Ed., and Alexander Miles, F.R.C.S. Ed. In Three Volumes. Illustrated. Henry Frowde and Hodder & Stoughton, Edinburgh, Glasgow, and London, 1912.

Heretofore American teachers have been their own text-book writers, but this admirable work, now issued in three volumes, is of such convincing merit, so entirely rational, clearly expressed, modern, and well arranged, that it is assured of a cordial reception and wide use by student, practitioner, and surgeon. The first volume, devoted to general surgery, covers the ground of Repair and Inflammation and its Consequences. Thereafter there is a general discussion upon the Surgery of the Blood-vessels, Lymphatics, Nerves, Muscles and Tendons, Bursæ, Bones and Joints. Thereafter some Regional Surgery.

The second volume is devoted entirely to Regional Surgery; the third volume to Operative Surgery.

Of special merit and help are the introductory paragraphs to each chapter on Surgical Anatomy and Physiology, the authors having exhibited extraordinary skill in selecting those points of direct importance from the standpoint of the surgeon. Throughout there is an orderly, systematized, comprehensive, and keen directness of teaching which assures for this work first rank. It can be commended without reservation as a source from which the best and most modern surgical thought can be obtained by the expenditure of the least time and trouble. For the student as the basis of systematic study it has no superior.

THE PRACTICE OF UROLOGY. A Surgical Treatise on Genito-Urinary Diseases, Including Syphilis. By Charles H. Chetwood, M.D., LL.D. Illustrated. William Wood & Company, New York, 1913.

An apt title, worthily typed, papered, and illustrated by its publisher, characterized by a forcefulness of style, a clear understanding of the needs of its readers, an unerring judgment as to the diagnostic and therapeutic measures of major value, and a detailed description of technique—these are the features that make it peculiarly helpful both to the general practitioner and to him who occasionally treats affections of the genito-urinary tract and syphilis, and also to the specialist who needs a ready reference book for such unusual cases as present themselves at rare intervals. With some of his teachings individual specialists will be at variance, but to the book as a whole even the most conservative must accord unstinted praise.

SURGERY OF DEFORMITIES OF THE FACE, INCLUDING CLEFT PALATE. By John B. Roberts, A.M., M.D. Illustrated. William Wood & Company, New York, 1912.

After preliminary chapters devoted to the development of Plastic Surgery, a Survey of the Anatomy of the Face, Characteristics of Surgery of the Face and the

Principles of Plastic Surgery of the Face, Local Discolorations and Tattooing are considered. These matters are taken up in detail, beginning with gunpowder and local discolorations and tattooing, and including disfiguring skin diseases such as milium, lanugo, nevus, absence or loss of hair, and tumors. Thereafter follows a discussion of Deformities of the Mouth and Lips, Cleft Palate, Cheiloplastic Operations, Deformities of the External Ear, of the Nose, and the Eyelids and Eyeball.

The book is a scholarly presentation of nearly all that is known upon these subjects, supplemented by ingenious suggestions of the author's own devising. It is one of distinct use to the surgeon, usually but little familiar with the best methods of remedying a variety of fortunately not very common disfigurements.

CORRESPONDENCE.

LONDON LETTER.

BY J. CHARLTON BRISCOE, M.D.

The question of the reorganization of London University is one that has been engaging the attention of a Royal Commission for the past four years. During the early years of its existence London University was a university in name only, as it was simply an examining body which granted degrees without undertaking any of the teaching functions usually associated with an academic body. Thirteen years ago an attempt was made to form a corporate university by affiliating the various colleges scattered about the metropolis to the central body, internal degrees being granted to students of these colleges and external degrees to students outside them. This has led to an unsatisfactory state of affairs, and the Commissioners speak of the internal and external sides as pursuing incompatible ideals. Although they do not recommend the abolition of the external degrees, the measures that they would introduce would certainly lead to that result. The contact between teacher and student may be regarded as the essence of a university, and to attain this the Commissioners suggest that a students' quarter should be formed in London to enable mutual intercourse both of teachers and students. This suggestion will be extremely difficult to follow out, for not only are the existing colleges scattered over wide areas, but there is a continual tendency for the big hospitals to move from the central parts of London to its outer rings, and that means the removal of a very large number of students from the neighborhood of the University. The Commissioners realize that the first thing to be done is to secure a central permanent home for the University. When this has been done the work will be mainly carried on by means of "faculties" distributed among the different colleges. These constituent colleges will have to be under the financial and educational control of the University, or it will be difficult to secure efficiency and unity of aim in teaching. There will probably be considerable difficulty in persuading long-established institutions to allow the central university to assume control of their funds and educational curriculum, yet such a condition seems essential if the teaching of the University is to be carried on with economy and efficiency.

The medical benefits under the National Insurance Act have now been in operation over three months. There are many grumbles both from doctors and insured patients as to defective arrangements. The London Insurance Committee has passed a resolution recognizing that the service is inefficient, and asking for amendment. It was reported that in one case a doctor had so many patients that he was treating them several hours a day at the rate of one a minute. Insured persons have complained that they do not get sufficient attention, and that many panel doctors do not see their

patients until the evening. Indeed, conditions are said to be worse than under the old club system. There are at present fewer doctors in London on the panel than there used to be for clubs before the introduction of the act, and yet the number of insured persons has increased fourfold. Unless the conditions are quickly improved the best type of medical men will not join the service, and the term "panel doctor" will become a derogatory one.

The inhabitants of Hampstead have been much perturbed by a fishy or oily taste in the water supplied them by the Metropolitan Water Board. The taste was so noticeable that many feared that the water had been deliberately polluted and would be deleterious to health. These fears have now been calmed by the announcement that the cause of the pollution has been discovered. In order to insure the greatest possible purity of water, it is subjected to prolonged storage, and in one of the storage reservoirs it was found that algæ were growing. These algæ are quite innocuous, but they impart a strong "fishy" taste to the water in which they grow. It is said that this kind of pollution has not occurred before in this country. The water supplied to Londoners is usually of such excellent quality that any deviation from its accustomed purity is very noticeable.

A new proposal is before the London County Council to utilize the old Thames steamboats as open-air schools for children. Open-air schools are already held in the parks for children with consumptive tendencies, but this proposal if adopted will make quite a new departure and may solve the problem of what to do with our old steamboats, for these were never able to pay their way when carrying passengers.

The spread of infectious diseases among children must frequently be helped by the crowding together in badly ventilated and insanitary kinema-picture palaces. These shows are often carried on in a disused shop and have no proper means of ventilation. They require rigorous inspection if they are to be kept in a healthy state for the thousands who visit them. This is obviously a further duty for the medical officer of health.

A novel competition has recently been held in London with the object of stirring up a healthy emulation among the various societies which instruct poor women in the principles of mothercraft. There are over fifty schools for mothers and local health societies in London, and these held competitions among themselves to qualify for the final Health Exhibition week. One of the features of the final competition was a *viva voce* examination in mothercraft. Mothers were asked simple questions on the feeding and upbringing of infants, and these questions had to be answered verbally, so that the examination formed a real trial of their skill and knowledge. These schools of instruction for poor mothers are of great help in preventive medicine and will doubtless have a favorable effect in lowering the rate of infant mortality.

Several measures are now before Parliament of interest to the medical profession. The Home Secretary has reintroduced his bill for the treatment of mental defectives, which had to be dropped last year owing to the pressure of other business. The bill has been revised in the meantime, but has not been changed in any of its essential particulars. The definition of feeble-mindedness has always been the cause of considerable difficulty, as the interpretations of the term are so wide and various. The first bill defined a feeble-minded person as one who, while capable of earning his living in favorable circumstances, was unable to compete on equal terms with his fellows, and of managing his affairs with ordinary prudence. The new bill describes him as a person in whom mental defectiveness not amounting to imbecility exists from an early age, and who requires care for his own protection and the protection of others, or in the case of a child is incapable of receiving proper benefit from the instruction in ordinary schools. The president of the Local Government Board has also brought in a milk bill which is somewhat of a hardy annual. The pre-

decessors of the present bill have met with such a uniformly bad fate that we can scarcely feel very hopeful of the chances of the present fledgling. Its main object is to provide for the effective registration of dairies and dairymen, and the inspection of milk so that a supply of pure milk may be guaranteed. It is to be hoped that these two bills will be passed during the present session.

We regret to have to record the death of a well-known surgeon and famous "blue," Mr. R. B. Etherington-Smith. He was surgical registrar and warden at St. Bartholomew's Hospital, and a few days ago operated on a case of gangrene of the lung. Next day he was taken ill, and in a very short time died of pneumococcal peritonitis. It is thought that he must have become infected at the time of the operation. Mr. Etherington-Smith had a very distinguished athletic career and was one of the best known Cambridge "blues." He carried off nearly all the prizes in oarsmanship during his residence at Cambridge, and also won many triumphs at Henley. He was in much request as a coach, and he did a great deal of work for his university, where he will be greatly missed. Only thirty-five years of age, he had already formed a considerable practice as a consulting surgeon, and a large circle of friends will regret his untimely death.

PARIS LETTER.

BY CHARLES G. JARVIS, M.D.

The event of the current month has been the International Congress on Physical Culture, which was opened on the 17th inst. by the President of the Republic. Delegates were present from twenty-five different countries. In the course of his speech the Turkish representative remarked that the poor physical condition of the Ottoman army was partly responsible for its defeat at the hands of the Balkan allies. The papers read at the Congress were for the most part of great interest and practical value. Among the subjects discussed the following may be mentioned: The importance of physical treatment in mentally backward children; the action of physical treatment on the heart, also on deformities due to rickets, etc.; the various methods of respiratory gymnastics. The Congress passed a resolution expressing the desire that physical culture be henceforth a compulsory part of the curriculum in secondary schools for both sexes, this branch being taught and supervised by special teachers. The interest of the Congress was much enhanced by a very complete and well-organized exhibition of physiological instruments for testing physical condition, and of appliances for physical treatment and sports. Furthermore, several demonstrations were given by athletic schools or societies from France, Sweden, England, and Italy. The teachings of the Congress come at a very opportune moment, when the young people of France are awakening to the necessity of being strong and ready for the hardships of a possible war.

As a reply to the new and formidable armaments of Germany, the French Parliament is about to pass a law extending to three years the term of compulsory military service for every valid young Frenchman without any exception. The medical students, like the rest of the nation, cheerfully accept this sacrifice, for it is a necessary one. But they are trying to mitigate the evil by asking to be drafted into the army medical service as early as possible. They would act at first as male nurses, then as assistant surgeons; they would thus not lose contact with things medical, and, far from wasting their time, they would acquire valuable clinical and operative experience. Another important request of the medical students is to be allowed to serve at least part of their time in garrison towns where there is a medical school, so that they might proceed with their examinations. These demands are reasonable enough, but it is doubtful whether they will be granted. It must be confessed that heretofore the military authorities do not appear to have taken into sufficient account the valuable help that could be afforded by the medical students in the regimental in-

firmaries and in the military hospitals. As a consequence of the "three-year law" the Association of Medical Students, at its last meeting, passed a resolution demanding that henceforth foreigners, not being subject to military service, should not be allowed to practice in France. A vote is to be taken on this motion at the next Congress of the Federation of Medical Students to be held in a few days' time.

Any measure tending to restrict the excessive number of doctors in France is sure to be welcomed by the profession. In connection with this vexed subject the recently published Directories afford interesting figures. Thus we find that since 1903 the number of doctors has risen from 17,602 to 22,979, an increase of 5377, more than a thousand of which have settled in Paris. Whereas the population has increased in the large cities, the rural districts have become more sparsely populated; yet the number of doctors has increased in the country also. In Auvergne, for example, there was in 1903 one doctor for 3224 inhabitants; the proportion is now one doctor for 2351 inhabitants. The plethora naturally reaches its maximum in Paris, which can boast of an average of one doctor for 680 inhabitants. Certain residential districts especially are too well provided: thus in the "Europe" quarter the proportion is one doctor for 94 inhabitants! This is the record. As a contrast we may mention that several of the poorer country districts have very few doctors indeed: thus the "department" of the Hautes Alpes has a population of 105,083, with only 29 doctors. In this department a large area with 35,000 inhabitants has no doctor at all. In Corsica the situation is even worse: 19 districts aggregating 60,000 inhabitants are deprived of immediate medical assistance. The reason for this regrettable state of affairs is of course that the population is extremely poor and the country very mountainous, making medical practice anything but a pleasant or profitable business.

Professor Monprofit (of Angers), who as announced in a previous letter was in charge of the surgical organization at Salonika, has just given to the Paris Academy of Medicine a most interesting account of his experiences in the Balkans war. The teachings of the two preceding great wars—the South African and the Russo-Japanese—have been entirely confirmed. Wounds received on the battle-field nowadays are less deadly than formerly for several reasons, the first of which appears to be the rule of non-interference except in case of obvious necessity. Each Servian and Greek soldier carried with him a first-aid dressing, and to the timely application of this dressing Monprofit ascribes a very great importance in lessening mortality. Then of course there is the better equipment of the ambulances and field hospitals and the more thorough training of the surgical and nursing staffs. The French surgeon extols the value of tincture of iodine applied immediately on and in the wounds. But apart from these factors it is certain that the wounds inflicted by the narrow bullet—such as the Mannlicher used by the Turks—traveling at a very high rate of speed, are much less deadly as they are clean-cut and heal readily. On the contrary, shrapnel wounds are always severe. Another favorable factor is the fact that the allies are nearly all sober and hardy men, and their strong constitution is doubtless responsible to a great extent for their quick recovery from gunshot wounds.

On Wednesday, 19th inst., the President of the Republic, who has already given many proofs of the interest he takes in the welfare of the sick poor, inaugurated the new "Pitié" hospital. It is situated next to the old and famous "Salpétrière" hospital, well known to students of neurology, in the southeastern district of Paris. The new buildings, which contain 988 beds, are up to date in every respect and should be visited by medical men who come to Paris.

It may be interesting for Americans who intend following postgraduate courses in Paris to know that a very complete "Handbook on Medical Education in Paris" will be received free of charge on applying to Dr. Desfosses, care of *La Presse Médicale*, 120 Boulevard St. Germain, Paris.